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VOLUME 43

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The present volume is the forty-third of this series.

The Bulletin, publication of which was begun in 1875, is a series of more elaborate papers, issued separately, and, like the Proceedings, based chiefly on the collections of the National Museum.

A quarto form of the Bulletin, known as the "Special Bulletin," has been adopted in a few instances in which a larger page was deemed indispensable.

Since 1902 the volumes of the series known as "Contributions from the National Herbarium," and containing papers relating to the botanical collections of the Museum, have been published as Bulletins.

RICHARD RATHBUN,
Assistant Secretary, Smithsonian Institution,
In charge of the United States National Museum.

February 27, 1913.

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BURKE, CHARLES VICTOR. A new genus and six new species of fishes of the family Cyclogasteridæ.—No. 1941. December 12, 1912 [1] 567–574

New genus: *Polypera*.
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CLARK, AUSTIN HOBART. The crinoids of the Museum fuer Naturkunde, Berlin.—No. 1937. November 20, 1912 [1] ... 381–410

New species: *Comissia hartmeyeri, Tropiometra audouini.*

COCKERELL, T. D. A. Names applied to the Eucerine bees of North America.—No. 1932. October 19, 1912 [1] 261–273

CRAWFORD, J.C. Descriptions of new Hymenoptera No. 5.—No. 1927. September 7, 1912 [1] 163–188

New genera: *Coccidoctonus, Diaulinopsis.*
New species: *Podagrion echthrus, Eurytoma piuræ, Cheiropachus brunneri, Cerambycobius townsendi, C. peruvianus, Coccidoctonus trinidadensis, Spintherus pulchripennis, Cecidostiba burkei, C. ashmeadi, C. thomsoni, Scymnophagus secundus, Catolaccus townsendi, Chrysocharis parksi, C. ainsliei, Closterocerus utahensis, C. winnemanæ, Horismenus urichi, Pleurotropis rugosithorax, Derostenus punctiventris, D. pictipes, Tetrastichus gowdeyi, Elachertus johannseni, E. benefactor, Diaulinopsis callichroma, Diaulinus pulchripes, D. websteri, Notanisomorpha ainsliei, Comedo koebelei, C. anomocerus, C. hookeri.*
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DOOLITTLE, ALFRED A. Notes on the occurrence of the crustacean Alonopsis in America, with description of a new species.—No. 1940. December 31, 1912 [1] 561–565

New species: *Alonopsis aureola.*

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FISHER, WALTER K. Four new genera and fifty-eight new species of starfishes from the Philippine Islands, Celebes, and the Moluccas.—No. 1944. February 5, 1913 [1] 599–648

New genera: *Ctenopleura, Astromesites, Perissogonaster, Astrothauma.*

New species: *Sidonaster psilonotus, Ctenodiscus orientalis, Goniopecten asiaticus, Prionaster analogus, P. gracilis, P. megaloplax, Astropecten eremicus, A. luzonicus, A. tenellus, A. pedicellaris, Ctenopleura astropectinides, Ctenophoraster diploctenius, Psilaster gotoi, P. robustus, Astromesites compactus, Persephonaster euryactis, P. anchistus, P. luzonicus, P. tenuis, P. multicinctus, P. suluensis, P. œdiplax, P. habrogenys, P. monostœchus, Tritonaster evorus, Dipsacaster diaphorus, Patagiaster sphærioplax, Dytaster (Koremaster) evaulus, Mimaster notabilis, Pseudarchaster oligoporus, Aphroditaster microceramus, Paragonaster stenostichus, Perissogonaster insignis, Rosaster nannus, R. mimicus, R. mamillatus, Nymphaster euryplax, N. dyscritus, N. mucronatus, N. leptodomus, N. moluccanus, N. arthrocnemis, N. meseres, N. habrotatus, N. atopus, Ceramaster smithi, Peltaster cycloplax, Sphæriodiscus scotocryptus, Iconaster perierctus, Astroceramus lionotus, A. sphæriostictus, Calliaster corynetes, Astrothauma euphylacteum, Anthenoides granulosus, A. lithosorus, A. rugulosus.*

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MALLOCH, J. R. One new genus and eight new species of dipterous insects in the United States National Museum collection.—No. 1945. December 31, 1912 [1] 649–658

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New genera: *Pseudohypocera, Parasyneura.*

New species: *Trupheoneura varipes, T. vitrinervis, T. suspecta, T. subfusca, Paraspiniphora trispinosa, P. slossonæ, P. spinulosa, Dohrniphora knabi, Hypocera rectangulata, H. convergens, Phora occidentata, Pseudohypocera clypeata, Beckerina orphuephiloides, Apocephalus spinicosta, A. coquilletti, A. similis, A. aridus, Aphiochæta conglomerata, A. californiensis, A. nedæ, A. barberi, A.*

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MERRILL, GEORGE P. A newly found meteoric iron from Perryville, Perry County, Missouri.—No. 1943. December 31, 1912[1] 595–597

NUTTING, CHARLES C. Descriptions of the Alcyonaria collected by the U. S. Fisheries steamer *Albatross*, mainly in Japanese waters, during 1906.—No. 1923. November 23, 1912[1] 1–104

New genera: *Helicoptilum, Primnodendron.*

New species: *Clavularia sulcata, C. japonica, Lithophytum roseum, Dendronephthya magnacantha, D. nigripes, D. oviformis, Alcyonium hilgendorfi, Nidalia gracilis, Bellonella flava, Anthomastus japonicus, Ptilosarcus brevicaulis, Pennatula longistyla, P. rubescens, P. brevipenna, P. inermis, Halisceptrum album, Umbellula eloisa, Kophobelemnon hispidum, Protoptilum orientale, Trichoptilum spinosum, Helicoptilum rigidum, Plumarella spicata, P. adhærans, Thouarella recta, T. alternata, Primnodendron superbum, Acanthogorgia fusca, A. paradoxa, Anthomuricea aberrans, Muriceides cylindrica, M. nigra, Muricella reticulata, M. abnormalis, Acis spinifera, Placogorgia japonica, Villogorgia brunnea, Elasmogorgia ramosa, Leptogorgia beringi, Callistephanus pacificus, Paragorgia regalis.*

OBERHOLSER, HARRY C. A revision of the forms of the great blue heron (Ardea herodias Linnæus).—No. 1939. December 12, 1912[1] 531–559

New subspecies: *Ardea herodias adoxa, A. h. hyperonca, A. h. oligista.*

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OSBURN, RAYMOND C. Bryozoa from Labrador, Newfoundland, and Nova Scotia, collected by Dr. Owen Bryant.—No. 1933. November 20, 1912[1] 275–289

PEARSE, ARTHUR S. Notes on certain amphipods from the Gulf of Mexico, with descriptions of new genera and new species.—No. 1936. November 20, 1912[1] 369–379

New genus: *Lembopsis*.
New species: *Lembopsis spinicarpus, Chevalia mexicana, Unciola laminosa.*

RADCLIFFE, LEWIS. Descriptions of a new family, two new genera, and twenty-nine new species of Anacanthine fishes from the Philippine Islands and contiguous waters.—No. 1924. September 27, 1912[1] 105–140

New genera: *Macrouroides, Parateleopus.*
New species: *Physiculus nigrescens, Regania filamentosa, R. sulcata, Hymenocephalus longipes, H. torvus, H. longiceps, Macrourus lucifer, M. nigromarginatus, M. macronemus, M. paradoxus, M. microps, M. dubius, M. asprellus, M. proximus, M. æquatoris, M. hyostomus, M. camurus, M. orthogrammus, M. parvipes, Matæocephalus nigrescens, M. adustus, Cœlorhynchus macrorhynchus, C. commutabilis, C. platorhynchus, C. acutirostris, C. notatus, C. argentatus, Macrouroides inflaticeps, Parateleopus microstomus.*
New family: *Macrouroididæ.*

RICHARDSON, HARRIET. Descriptions of a new genus of isopod crustaceans, and of two new species from South America.—No. 1929. September 27, 1912[1] 201–204

New genus: *Excirolana.*
New species: *Excirolana chilensis, E. braziliensis.*

———. Descriptions of two new isopods, an Apseudes and a Munnopsis, both from the Galapagos Islands.—No. 1926. September 7, 1912[1] 159–162

New species: *Apseudes galapagensis, Munnopsis longiremis.*

ROHWER, S. A. Notes on sawflies, with descriptions of new species.—No. 1930. September 30, 1912[1] 205–251

New genera: *Tanyphatnidea, Allantidea, Zalagium, Zamacrophya, Neopoppia, Senoclidea, Caulocampus, Dineuridea.*
New species: *Pamphilius (Pamphilius) nigritibialis, Arge geei, A. salicis, Tanyphatnidea microcephala, Diprion grandis, Monostegia nearctica, Rhogogaster truncatus, R. pitohatus, Sciapteryx coquilletti, Lagium erythrogastrum, L. angulabre, L. planifrons, Zalagium clypeatum, Macrophya zabriskiei, M. xanthonota, M. melanota, M. nigristigma, M. externiformis, M. lineatana, M. tenuicornis, Zama crophya nigrilabris, Tenthredo (Labidia) anomocerus, T. (L.) alienatus, T. (L.) anomus, Neopoppia metallica, Senoclidea amœla, S. terminata, Rhadinocerœa lucida, Paracharactus leucostomus, P. niger, P. nigrisomus, Monophadnus truncatus, Perclista quercus, Nesoselandria ceylonensis, Stromboceros (Prostromboceros)*

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planifrons, *S.* (*Strombocerida*) *albimaculatus*, *S.* (*Neostromboceros*) *metallica*, *Strongylogaster remotus*, *S. alboannulatus*, *Craterocercus floridanus*, *Eurura serissimæ*, *E. nigrella*, *Pontania crassicornis*, *P. lucidæ*, *P. agama*, *P. foveata*, *Amauronematus knabi*, *Nematus procidentius*, *Acordulecera antennata*, *A. scutellata*, *A. foveata*, *A. parva*, *A. erythrogastra*, *A. caryæ*, *A. nigrata*, *A. portiæ*, *A. nigritarsis*, *A. basirufa*, *A. flavipes*, *A. quercus*.

New subgenera: *Prostromboceros*, *Neostromboceros*.

New subspecies: *Tenthredo* (*Labidia*) *opimus coloradensis*.

New variety: *Pontania nevadensis var. nigripecta*.

New name: *Macrophya nebraskensis*.

———. Studies in the woodwasp superfamily Oryssoidea, with descriptions of new species.—No. 1925. September 27, 1912 [1] 141–158

New species: *Oryssus modestus*, *O. abietes*, *O. pini*, *O. relativus*, *O. hopkinsi*.

TOWNSEND, CHARLES H. T. Descriptions of new genera and species of muscoid flies from the Andean and Pacific coast regions of South America.—No. 1935. November 22, 1912 [1] 301–367

New genera: *Plagiops*, *Euthelaira*, *Œstrogaster*, *Neotrafoia*, *Eugymnochæta*, *Incamyia*, *Spathimyia*, *Chætosisyrops*, *Eucadorana*, *Dolichostoma*, *Erigonopsis*, *Vibrissomyia*, *Andinomyia*, *Epalpodes*, *Œstrohystricia*, *Eudejeania*, *Metopiops*, *Chætophorocera*, *Protogonia*, *Jænimyia*, *Aglummyia*, *Œstropsis*, *Euparaphyto*, *Chloronesia*, *Phænopsis*, *Euselenomyia*. *Perua*.

New species: *Euphorocera peruviana*, *E. minor*, *Plagiops meridionalis*, *Eumyothyria meridionalis*, *Euthelaira inambarica*, *Œstrogaster fumosus*, *Tropidopsis connectans*, *Neotrafoia incarum*, *Eugymnochæta equatorialis*, *Dexodes meridionalis*, *Incamyia cuzcensis*, *Spathimyia ferox*, *Chætosisyrops montanus*, *Siphosturmia pollinosa*, *Eucadorana bicolor*, *Dolichostoma alpina*, *Erigonopsis arequipæ*, *Vibrissomyia lineata*, *V. bicolor*, *Andinomyia cruciata*, *Epalpodes equatorialis*, *Archytas incasana*, *Œstrohystricia subalpina*, *Dejeania andina*, *Eudejeania subalpina*, *E. nigra*, *Lasiopalpus subalpinus*, *Metopiops mirabilis*, *Brachymasicera subpolita*, *Chætophorocera andina*, *C. fuscosa*, *Salmacia peruviana*, *S. pacifica*, *S. chætosa*, *S. alpina*, *Protogonia ocellaris*, *Triachora equinoctialis*, *Belvosia piurana*, *Jænimyia albicincta*, *J. punctata*, *Blepharipeza montagna*, *Aglummyia percinerea*, *Œstropsis viridis*, *Sarcophaga auribarbata*, *S. aurigena*, *S. argentea*, *Sarcophagula peruana*, *Euparaphyto alpina*, *Chloronesia andina*, *Metopia meridiana*, *Phænopsis arabella*, *Sarcomacronychia trivittata*, *Euselenomyia peruviensis*, *Perua cuzcana*, *Megaprosopus andinus*.

New name: *Cnephalodopsis*.

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VIERECK, H. L. Descriptions of one new family, eight new genera, and thirty-three new species of Ichneumon-flies.—No. 1942. December 31, 1912 [1] 575–593

New genera: *Myersia, Thaumatotypidea, Bucculatriplex, Habrobraconidea, Cymodusopsis, Ectopimorpha, Mallochia, Neopristomerus.*

New species: *Myersia laminata, Cardiochiles nigriceps, Chelonus (Chelonus) buscklella, Habrobraconidea bicoloripes, Macrocentrus amicroploides, Meteorus archipsidis, Apanteles (Protapanteles) harnedi, A. (P.) oxyacanthoidis, Rogas laphygmæ, Apanteles (Stenopleura) chilocida, A. (Stenopleura) depressus, A. (S.) podunkorum, Angitia plutellæ, Anisitsia nigerrima, Barydotira hammari, Bathythrix kuwanæ, Callicryptus magnificus, Calliphrurus? tæniogaster, Campoplex epinotiæ, C. polychrosidis, Casinaria eupithecia, Cremastus (Cremastidea) chinensis, Crypturopsis microgaster, Cymodusopsis aristoteliæ, Pimpla (Epiurus) kuwanæ, Herpestomus hyponomeutæ, Hyposoter diversicolor, Hypothereutes elyi, H. nigrolineatus, Pimpla (Iseropus) viduiformis, Mallochia agenioides, Pimpla (Pimpla) parnaræ, Polycyrtus cockerellæ.*

New family: *Myersiidæ.*

New subgenera: *Cremastidea, Neonortonia.*

New name: *Ichneumon klageri.*

WILSON, CHARLES BRANCH. Dragon flies of the Cumberland Valley in Kentucky and Tennessee.—No. 1928. September 7, 1912 [1] 189–200

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DESCRIPTIONS OF THE ALCYONARIA COLLECTED BY THE U. S. FISHERIES STEAMER "ALBATROSS," MAINLY IN JAPANESE WATERS, DURING 1906.

By CHARLES C. NUTTING,
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INTRODUCTION.

But an insignificant proportion of the alcyonarian material collected by the U. S. Fisheries steamer *Albatross* during her cruise in the Northwest Pacific during 1906 was secured outside of Japanese waters. Hence this paper is substantially a contribution to our knowledge of the Japanese Alcyonaria.

The surprising richness of the marine fauna in the vicinity of Japan has long been recognized, and the extent of the collection of Alcyonaria secured by the *Albatross* was, in some degree at least, anticipated, although the number of new forms is somewhat greater than might have been expected, especially in view of the number of excellent papers that have appeared in recent years treating of the Alcyonaria of those regions.

A number of more or less extensive collections have made their way to European museums and have been reported on by various writers. Perhaps the most important of these collections was that made during 1904–5 by Dr. F. Doflein and reported on by Prof. W. Kükenthal, who has discussed the Alcyonacea and Gorgonacea[1] in three masterly monographs, giving excellent discussions of these groups in general, as well as of the species collected by Doctor Doflein. The Pennatulacea are being reported on by Dr. H. Balss, who has given some preliminary descriptions in the Zoologischer Anzeiger for 1909.

A notable work, Primnoidæ von Japan, by K. Kinoshita, appeared in the Journal of the College of Science of the Imperial University of Tokyo, 1908. The descriptions and figures in this work are excellent, and proved an unusually efficient aid in identification of species in the progress of the present work.

[1] Beitrage zur Naturgeschichte Ostasiens. Herausgegeben von Dr. F. Doflein, Japanische Alcyonaceen, 1906; Japanische Gorgoniden, Teil I, 1906; Teil II, 1909.

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Wright and Studer, in their report on the Alcyonaria of the *Challenger* expedition, described a number of species from Japanese waters, and others have since been reported from that region.

In view of these comprehensive monographs and other less pretentious papers, it would seem that the alcyonarian fauna of the Japanese region had been pretty thoroughly worked, and that further investigations of the same region would not be very profitable, at least so far as the discovery of new forms is concerned. On the contrary, however, the collection secured by the *Albatross* is of exceptional interest, adding many species, most of which are new, to the already extensive list from that region, as well as furnishing numerous items of interest concerning the geographical distribution of the group.

As a whole the Japanese Alcyonaria are more circumscribed in their distribution than one would consider likely, there being comparatively few species found both in Japanese waters and other parts of the Western Pacific, as is well shown in comparing the lists of species in the present work with those found in the monographic reports on the alcyonarians of the Gulf of Manaar by Thomson and Henderson,[1] and the two bulky works which constitute the reports on the Alcyonaria secured by the *Investigator* in the Indian Ocean.[2] Such a comparison shows that the faunæ of the Indian Ocean and of Japan are by no means intimately related, reminding one of the same condition of affairs found in the Caribbean Sea as compared with the adjacent waters of the North Atlantic.

SYSTEMATIC SYNOPSIS OF ALCYONARIANS COLLECTED BY THE U. S. FISHERIES STEAMER "ALBATROSS" IN THE NORTHWEST PACIFIC DURING 1906.

[The asterisk (*) indicates a new genus or species.]

Order ALCYONACEA.

Family CORNULARIDÆ.

Clavularia dispersa, C. sulcata, C. eburnea, C. japonica.**

Family NEPHTHYIDÆ.

*Lithophytum roseum.**
Dendronephthya splendens, D. acaulis, D. magnacantha, D. nigripes,* D. oviformis.**
Paraspongodes striata.

Family ALCYONIDÆ.

Alcyonium kükenthali, A. gracillimum.*
*Nidalia rubra, N. gracilis.**
*Bellonella flava.**
*Anthomastus japonicus.**

[1] Report on the Pearl Oyster Fisheries of the Gulf of Manaar, The Alcyonaria, 1905.

[2] Thomson and Henderson, Report on the Alcyonarians collected by R. I. M. S. S. *Investigator* in the Indian Ocean. 1 The Alcyonaria of the Deep Sea, 1906; 2. (Thomson and Simpson) The Alcyonaria of the Littoral Zone, 1909.

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Family SIPHONOGORGIDÆ.

Siphonogorgia splendens.

Order PENNATULACEA.

Family PENNATULIDÆ.

*Ptilosarcus brevicaulis.**
Pennatula aculeata, P. sulcata, P. murrayi, P. pendula, P. naresi, P. longistyla, P. rubescens,* P. brevipenna,* P. inermis.**
Pteroides sagamiense.
*Halisceptrum gustavianum, H. cystiferum, H. album.**

Family VIRGULARIDÆ.

Virgularia, sp.?
Balticina finmarchica, B. pacifica, B. californica.
Halipteris christii.

Family UMBELLULIDÆ.

*Umbellula magniflora, U. carpenteri, U. eloisa.**

Family KOPHOBELEMNONIDÆ.

*Kophobelemnon ferrugineum, K. hispidum.**

Family ANTHOPTILIDÆ.

Anthoptilum murrayi.

Family ECHINOPTILIDÆ.

Echinoptilum macintoshi.

Family PROTOPTILIDÆ.

*Protoptilum orientale.**
Stachyptilum macleari.
*Trichoptilum spinosum.**
Helicoptilum rigidum.**

Order GORGONACEA.

Suborder HOLAXONIA.

Family CHRYSOGORGIDÆ.

Lepidogorgia petersi.
Chrysogorgia lata, C. flexilis, C. agassizii, C. dichotoma.

Family PRIMNOIDÆ.

Calyptrophora ijimai, C. japonica, C. kerberti.
Stachyodes megalepis.
Caligorgia flabellum, C. ventrilabrum, C. aspera.
Plumarella spinosa, P. flabellata, P. carinata, P. spicata, P. adhærans.**
Thouarella hilgendorfi, T. recta, T. typica, T. striata, T. alternata.**
Primnodendron superbum.**

Family MURICEIDÆ.

Acanthogorgia striata, A. fusca, A. paradoxa.**
*Anthomuricea aberrans.**
Muriceides cylindrica, M. nigra.**
Muricella reticulata, M. abnormalis.**
Thesea placoderma.
*Acis squamata, A. spinifera.**

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*Placogorgia japonica.**
*Villogorgia brunnea.**
*Elasmogorgia filiformis, E. ramosa.**
Menella indica.
Bebryce hicksoni.

Family PLEXAURIDÆ.

Euplexaura pinnata.

Family ISIDÆ.

Acanella normani.
Bathygorgia profunda.
Ceratoisis paucispinosa, C. philippinensis.
Melitodes dichotoma.
Parisis fruticosa.

Family GORGONIDÆ.

Platycaulus danielsseni.
*Leptogorgia beringi.**
*Callistephanus pacificus.**

Family GORGONELLIDÆ.

Scirpearella gracilis, S. rubra.

Suborder SCLERAXONIA.

Family BRIAREIDÆ.

*Paragorgia nodosa, P. regalis.**

The above list shows that the collection contains 102 species of Alcyonaria distributed among 54 genera belonging to 18 families. There are 40 new species and 2 new genera. The Muriceidæ includes the largest number of genera (11) and 17 species. The family containing the greatest number of species is the Primnoidæ, with 18 species and 1 new genus.

The genus represented by the largest number of species is *Pennatula*, with 9 species, 4 of which are new, and this genus probably has the greatest geographical range.

The 40 new species, constituting just about 39 per cent of the whole number, are pretty well distributed over the various families and genera of the order, although there is a proportionally greater number in the family Muriceidæ than in any other, 11 of the 17 species of this family being new. Of the 18 species of the Primnoidæ but 5 are new.

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Record of dredging stations at which Alcyonaria were secured during the northwest Pacific cruise of the "Albatross" in 1906.

Station number.	Position.	Depth in fathoms.	Kind of bottom.	Species of Alcyonaria.
4765	West pt. Yunaska Id., S. 37° E., 43.5 miles.	1,217	Fine black sand.....	*Anthoptilum murrayi.*
4766	Koniuji Id., S. 32.5° W., 27 miles.	1,766	No specimen.....	*Pennatula aculeata, Bathygorgia profunda.*
4768	54° 20′ 30″ N.; 179° 09′ 30″ E.	764	Green-brown mud: fine black sand.	*Balticina pacifica.*
4769	54° 30′ 40″ N.; 179° 14′ E....	244–237	Gray sand; green mud.	*Plumarella spinosa.*
4771	54° 30′ N.; 179° 17′ E.....	426	Broken shells.....	*? Plumarella spicata, ? Thouarella hilgendorfi.*
4772	54° 30′ 30″ N.; 179° 14′ E....	344–372	Greenish brown sand..	*Paragorgia nodosa.*
4778	Semisopochnoi Id., r. t. S. 45° W., l. t. S. 12° W., about 12 miles.	43–33	Fine black gravel.....	*Thouarella striata, Primnodendron superbum.*
4780	52° 01′ N.; 174° 39′ E.....	1,046	Gray mud; sand; pebbles.	*Plumarella spicata, Leptogorgia beringi.*
4781	52° 14′ 30″ N.; 174° 13′ E....	482	Fine gray sand; pebbles.	*Clavularia eburnea, Plumarella spinosa, Muriceides cylindrica, Callistephanus pacificus.*
4784	East Cape, Attu Id., S. 18° W., 4 miles.	135	Coarse pebbles.....	*Plumarella flabellata, Muriceides nigra.*
4787	North pt. Copper Id., N. 79° E., 8.5 miles.	54–57	Green sand.....	*Plumarella spinosa.*
4791	Cape Monati, Bering Id., N. 52° W., 8.75 miles.	76–72	Rocky.....	*Clavularia sulcata.*
4792	Cape Monati, Bering Id., N. 50° W., 8.2 miles.	72	Pebbles.....	*Balticina pacifica.*
4798	Torperkov Id., Hbr. of Nikolski, Bering Id., N. 58° E., 44 miles.	2,700	.....	*? Helicoptilum rigidum.*
4807	Cape Tsiuka, S. 58° W., 10.3 miles.	44–47	Shells; coarse gravel...	*Nidalia rubra, Ptilosarcus brevicaulis.*
4808	Cape Tsiuka, S. 61° W., 10.6 miles.	47	Sand; shells; coarse gravel.	*Ptilosarcus brevicaulis, Halisceptrum gustavianum, Melitodes dichotoma.*
4815	Niigata Lt., S. 26° E., 21.5 miles.	70	Dark green sand.....	*Nidalia rubra, Siphonogorgia splendens, Pennatula longistyla,*
4817	Niigata Lt., S. 29° E., 18 miles.	61	Fine gray sand.....	*Halisceptrum album.*
4837	Tateishia Zaki Lt., S. 53° E., 8 miles.	57	Brown-green mud....	*Elasmogorgia filiformis.*
4842	Saigo Misaki (Dogo Id.), S. 64° W., 6.1 miles.	82	Fine green sand; shells.	*Echinoptilum macintoshi.*
4876	Oki Shima, S. 29° W., 5.3 miles.	59	Fine gray sand; broken shells.	*Ptilosarcus brevicaulis, Pennatula inermis, Halisceptrum album.*
4879	Oki Shima, S. 70° W., 7.5 miles.	59	.....do.....	*? Dendronephthya acaulis, D. splendens.*
4888	Nomo Zaki, N. 57° E., 16.5 miles.	71	Dark gray sand; broken shells.	*Clavularia japonica, Dendronephthya coriformis.*
4890	Ose Saki Lt., N. 2° W., 10 miles.	135	Rocky.....	*Acanthogorgia paradoxa, Melitodes dichotoma.*
4902	Ose Saki Lt., N. 29° E., 5.5 miles.	106–95	Gray sand; broken shells; pebbles.	*Clavularia japonica, Dendronephthya splendens, Plumarella carinata, Muricella reticulata, Parisis fruticosa, Melitodes dichotoma, Scirpearella gracilis, S. rubra.*
4904	Ose Saki Lt., N. 41° E., 5 miles.	95	Green sand; broken shells; pebbles.	*Clavularia japonica, Bellonella flava, Siphonogorgia splendens, Chrysogorgia dichotoma, Plumarella adhærans, P. carinata, Thouarella typica, Acanthogorgia paradoxa, Thesea placoderma, Euplexaura pinnata, Parisis fruticosa.*
4905	Ose Saki Lt., N. 42° E., 4.7 miles.	95	.....do.....	*Plumarella adhærans, P. carinata, Thouarella hilgendorfi, ? Muriceides cylindrica, Parisis fruticosa.*
4913	Gwaja Shima, S. 38° E, 34 miles.	361	Gray sand; Globigerina; broken shells.	*Stachyodes megalepis.*
4924	Nagada Saki, N. 8° E., 18 miles.	159	No specimen; rocky...	*Calyptrophora japonica.*
4934	Sata Misaki Lt., N. 77.5° E., 7 miles.	153–108	Rocky.....	*Siphonogorgia splendens, Pennatula sulcata, P. murrayi, Thouarella hilgendorfi.*

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Record of dredging stations at which Alcyonaria were secured during the northwest Pacific cruise of the "Albatross" in 1906—Continued.

Station number.	Position.	Depth in fathoms.	Kind of bottom.	Species of Alcyonaria.
4935	Sata Misaki Lt., N. 58° E., 4.5 miles.	103	Stones	*Dendronephthya splendens, Siphonogorgia splendens, Stachyodes megalepis, Calyptrophora japonica, Acanthogorgia fusca, Placogorgia japonica, Bebryce hicksoni, Elasmogorgia ramosa, Parisis fruticosa, Melitodes dichotoma.*
4936	Sata Misaki Lt., N. 21° E., 5.7 miles.	103	.....do	*Dendronephthya magnacantha, D. splendens, Chrysogorgia dichotoma, Stachyodes megalepis, Caligorgia flabellum, C. aspera, Thouarella hilgendorfi, T. typica, Acanthogorgia striata, Muricella reticulata, Thesea placoderma, Acis squamata, A. spinifera, Placogorgia japonica, Villogorgia brunnea, Parisis fruticosa.*
4946	Okiko Jima, N. 31° E., 4 miles.	39	Brown sand; broken shells; pebbles.	*Nidalia gracilis.*
4947	Okiko Jima, N. 17° E., 4.4 miles.	51	.....	*Virgularia*, sp.?
4948	O Shima Lt., N. 11° E., 12 miles.	65	Dark gray volcanic sand; broken shell; pebbles.	*Pennatula brevipenna.*
4956	Misunoko Shima Lt., N. 22° W., 33 miles.	720	Green-brown mud; fine gray sand; Foraminifera.	*Kophobelemnon hispidum, Acanella normani.*
4958	Mizimoko Shima Lt., N. 26° W., 29.3 miles.	405	.....do	*Pennatula pendula.*
4959	Mizimoko Shima Lt., N. 23° W., 28.5 miles.	405–578	.....do	*Pennatula pendula, Trichoptilum spinosum.*
4960	Mizimoko Shima Lt., N. 19° W., 30.5 miles.	578	.....do	*Pennatula naresi.*
4973	Shio Misaki Lt., N. 82° E., 12.5 miles.	600	Brown mud; stones	*Pennatula naresi, Umbellula eloisa, Anthoptilum murrayi.*
4975	Shio Misaki Lt., N. 49° E., 7 miles.	712–545	Brown mud; pebbles; Foraminifera.	*Umbellula magniflora, Helicoptilum rigidum, Chrysogorgia flexilis.*
4976	Shio Misaki Lt., N. 59° E., 6.4 miles.	545–544	Brown mud; small stones.	*Anthomastus japonicus, Lepidogorgia petersi.*
4977	Shio Misaki Lt., N. 65° E., 7 miles.	544	Brown mud; fine sand.	*Kophobelemnon hispidum, Helicoptilum rigidum, Lepidogorgia petersi.*
4983	Benkei Mizaki Lt., S. 2° E., 12 miles.	428	Green mud	*Balticina finmarchica.*
4984	Benkei Mizaki Lt., S. 1° W., 15 miles.	248–224	.....do	*Balticina californica, Halipteris christii.*
4985	Kamoi Mizaki Lt., N. 17° E., 15.2 miles.	224	.....do.(?)	*Clavularia dispersa, Balticina pacifica.*
4986	Benkei Mizaki Lt., N. 35° E., 15 miles.	172	Fine black sand; black mud.	*Balticina californica.*
4987	Kamoi Mizaki Lt., N. 76° E., 3.2 miles.	59	Rocky	*Anthomuricea aberrans.*
4990	43° 40′ N.; 140° 58′ E	200	.....	*Kophobelemnon ferrugineum.*
4992	45° 24′ N.; 140° 40′ 10″ E	325	Green mud	*Clavularia dispersa.*
4998	47° 39′ 10″ N.; 141° 31′ 40″ E.	66	Brown mud, fine gray sand.	*Balticina finmarchica.*
5005	46° 04′ 40″ N.; 142° 27′ 30″ E.	42–43	Green mud; fine gray sand.	*Alcyonium gracillimum.*
5006	46° 04′ N.; 142° 29′ E	43–42	.....do	*Alcyonium gracillimum.*
5007	46° 03′ N.; 142° 31′ E	42	.....do	*Alcyonium gracillimum.*
5015	46° 44′ N.; 144° 02′ E	510	Green mud	*Halisceptrum cystiferum, Umbellula carpenteri.*
5016	46° 44′ 30″ N.; 143° 45′ E	64	Brown mud; fine black sand; coral; rock.	*Alcyonium kükenthali.*
5026	48° 36′ 10″ N.; 145° 17′ 30″ E.	119	Green mud; black sand; gravel.	*Lithophytum roseum.*
5029	48° 22′ 30″ N.; 145° 43′ 30″ E.	440	Black sand; gravel	*Ceratoisis philippinensis.*
5031	44° 04′ N.; 145° 32′ E	86	Dark sand; gravel	*Balticina pacifica.*
5043	42° 10′ 20″ N.; 142° 15′ 20″ E.	330–309	Brown mud; fine black sand; coral; sand.	*Anthomastus japonicus.*
5047	Kinka San Lt., N. 69.5° W., 11.6 miles.	107	Dark gray sand; broken shells; pebbles.	*Balticina finmarchica.*
5050	Kinka San Lt., N. 78° W., 25.7 miles.	266	Dark gray sand; broken shells; Foraminifera.	*Anthomastus japonicus.*
5054	Omai Saki Lt., S. 54° W., 29.5 miles.	282	Green mud; broken shells; Foraminifera.	*Protoptilum orientale.*
5056	Ose Saki., N. 37° E., 5 miles.	258	.....do	*Pennatula sulcata, Protoptilum orientale.*

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Record of dredging stations at which Alcyonaria were secured during the northwest Pacific cruise of the "Albatross" in 1906—Continued.

Station number.	Position.	Depth in fathoms.	Kind of bottom.	Species of Alcyonaria.
5070	Ose Saki, S. 8° W., 1.8 miles.	108	Mud; sand; broken shells.	*Dendronephthya magnacantha, Caligorgia aspera, Plumarella adhærans, Thouarella hilgendorfi, Acanthogorgia paradoxa, Muricella abnormalis, Placogorgia japonica, Melitodes dichotoma.*
5071	Ose Saki, S. 53.5° W., 2.6 miles.	57	.....(?).....	*Dendronephthya acaulis, Parasponogodes striata, Pennatula rubescens, Stachyptilum macleari, Menella indica.*
5072	Omai Saki Lt., S. 37° W., 11.7 miles.	284–148	Gray mud.....	*Pennatula inermis.*
5074	Omai Saki Lt., S. 37.5° W., 6.4 miles.	47	.....do.....	*Dendronephthya nigripes.*
5079	Omai Saki Lt., N. 29° E., 24 miles.	475–505	Pebbles.....	*? Chrysogorgia lata, Calyptrophora ijimai, Thouarella alternata, T. recta, Paragorgia regalis.*
5080	Omai Saki Lt., N. 23.5 E., 28 miles.	505	Fine gray sand; Globigerina.	*Umbellula carpenteri, Lepidogorgia peterri, Chrysogorgia agassizii, Calyptrophora ijimai, Thouarella alternata.*
5083	Omai Saki Lt., N. 23.5° E., 34.5 miles.	624	.....do.....	*Ceratoisis pauciepinosa.*
5087	Joka Sima Lt., S. 84.5° E., 14.8 miles.	614	Green mud.....	*Calyptrophora ijimai.*
5091	Joga Shima Lt., N. 15° W., 4.2 miles.	197	Green mud; coarse black sand; pebbles.	*Chrysogorgia lata.*
5092	Joga Shima Lt., N. 19° W., 3.5 miles.	70	Coarse black sand.....	*Pennatula sulcata.*
5093	Joga Shima Lt., N. 8° W., 5 miles.	302	.....do.....	*Calyptrophora kerberti, Thouarella hilgendorfi.*

It appears that alcyonarians were secured from 75 stations during the cruise. The greatest yield was from station 4936, at a depth of 103 fathoms, where 16 species were secured; the next best haul being from station 4894, with a yield of 11 species. This last was almost equaled at station 4935, where 10 species were dredged. Other good hauls were from station 4893, where 8 species were secured; and station 5070, yielding 8 species. All of these extraordinarily successful hauls were from depths ranging from 95 to 108 fathoms, and all were in Japanese waters.

The deepest haul was near Bering Island, where *Helicoptilum rigidum*, a species for which a new genus of pennatulids is described, was secured from a depth of 2,700 fathoms. At station 4766, near Koniuji Island, one of the Aleutian Group, in a depth of 1,766 fathoms *Pennatula aculeata* and *Bathygorgia profunda* were secured. At station 4765, *Anthoptilum murrayi* was dredged from 1,217 fathoms, and at station 4780, *Plumarella spicata* and *Leptogorgia beringi* from a depth of 1,046 fathoms. These were the four deepest hauls at which Alcyonaria were obtained. Of the 6 species from these depths, 3 are pennatulids, and 3 belong to the Gorgonacea, while all belong to families of wide distribution in the deep seas.

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Geographical and bathymetrical distribution of Alcyonaria collected by the "Albatross" in the northwest Pacific during 1906.

[The asterisk (*) indicates a new species.]

Name.	Geographical distribution.									Bathymetrical distribution (in fathoms).					
	Japanese waters.	Alaska and Bering Sea.	West coast of America.	East Indies.	Indian Ocean.	Hawaiian region.	Chinese coast.	South Seas (including Australia).	North Atlantic (including West Indies).	1 to 50.	50 to 100.	100 to 200.	200 to 500.	500 to 1,000.	Over 1,000.
Clavularia dispersa	+												+	+	
Clavularia sulcata *											+				
Clavularia eburnea	+												+	+	
Clavularia japonica *	+										+	+			
Lithophytum roseum *	+											+			
Dendronephthya splendens	+										+	+			
Dendronephthya acaulis	+										+				
Dendronephthya magnacantha *	+											+			
Dendronephthya nigripes *	+									+					
Dendronephthya oviformis *	+										+				
Paraspongodes striata	+				+						+				
Alcyonium kükenthali *	+										+				
Alcyonium gracillimum	+									+					
Nidalia rubra	+									+	+				
Nidalia gracilis *	+									+					
Bellonella flava *	+										+				
Anthomastus japonicus *	+												+	+	
Siphonogorgia splendens	+						+				+	+			
Pilosarcus brevicaulis *	+									+	+				
Pennatula aculeata		+	+						+		+	+	+	+	+
Pennatula sulcata	+										+	+	+		
Pennatula murrayi	+			+	+					+		+			
Pennatula pendula	+				+								+	+	
Pennatula naresi	+												+	+	
Pennatula longistyla *	+										+				
Pennatula rubescens *	+										+				
Pennatula brevipenna *	+										+				
Pennatula inermis *	+										+	+	+		
Pteroides sagamiense	+									+					
Halisceptrum gustavianum	+						+			+					
Halisceptrum cystiferum	+			+									+	+	
Halisceptrum album *	+										+				
Virgularia sp. ?	+										+				
Balticina finmarchica	+	+	+						+		+	+	+		
Balticina pacifica	+	+	+								+		+	+	
Balticina californica	+		+									+	+		
Halipteris christii	+								+				+		
Umbellula magniflora	+					+		+					+	+	+
Umbellula carpenteri	+					+		+						+	+
Umbellula eloisa *	+													+	
Kophobelemnon ferrugineum	+												+		
Kophobelemnon hispidum *	+													+	
Anthoptilum murrayi	+				+	+			+				+	+	+
Echinoptilum macintoshi	+					+					+	+			
Protoptilum orientale *	+												+		
Stachyptilum macleari	+			+							+	+			
Trichoptilum spinosum *	+												+	+	
Helicoptilum rigidum *	+													+	+
Lepidogorgia petersi	+			+										+	
Chrysogorgia lata	+			+		+						+	+	+	
Chrysogorgia flexilis	+		+	+		+						+	+	+	
Chrysogorgia agassizii	+								+					+	+
Chrysogorgia dichotoma	+				+						+	+			
Calyptrophora ijimai	+												+	+	
Calyptrophora japonica	+			+		+						+	+	+	
Calyptrophora kerberti	+												+	+	
Stachyodes megalepis	+											+	+		
Caligorgia flabellum	+				+							+	+	+	
Caligorgia ventrilabrum	+							+			+				
Caligorgia aspera	+											+			
Plumarella spinosa	+										+	+	+		
Plumarella flabellata	+											+			
Plumarella carinata	+										+	+			
Plumarella spicata *		+											+		+
Plumarella adhærans *	+										+	+			

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Geographical and bathymetrical distribution of Alcyonaria collected by the "Albatross" in the northwest Pacific during 1906—Continued.

Name.	Geographical distribution.									Bathymetrical distribution (in fathoms).					
	Japanese waters.	Alaska and Bering Sea.	West coast of America.	East Indies.	Indian Ocean.	Hawaiian region.	Chinese coast.	South Seas (including Australia).	North Atlantic (including West Indies).	1 to 50.	50 to 100.	100 to 200.	200 to 500.	500 to 1,000.	Over 1,000.
Thouarella hilgendorfi	+	?+	....	+	+	....	....	....	....	....	+	+	+	....	+
Thouarella recta *	+	....	....	....	....	....	....	....	....	....	....	....	+	+	....
Thouarella typica	+	....	....	....	....	....	....	....	....	....	+	+	....	....	....
Thouarella striata	....	+	....	....	....	....	....	+	....	+	....	....	+	....	....
Thouarella alternata *	+	....	....	....	....	....	....	....	....	....	....	....	+	+	....
Primnoadendron superbum *	....	+	....	....	....	....	....	....	....	+	....	....	....	....	....
Acanthogorgia striata	+	....	....	+	....	....	....	....	....	+	....	+	....	....	....
Acanthogorgia fusca *	+	....	....	....	....	....	....	....	....	....	....	+	....	....	....
Acanthogorgia paradoxa *	+	....	....	....	....	....	....	....	....	....	+	+	....	....	....
Anthomastus aberrans *	+	....	....	....	....	....	....	....	....	....	+	....	....	....	....
Muricides cylindrica *	+	+	....	....	....	....	....	....	....	....	+	....	+	....	....
Muricides nigra *	+	....	....	....	....	....	....	....	....	....	....	+	....	....	....
Muricella reticulata *	+	....	....	....	....	....	....	....	....	....	+	+	....	....	....
Muricella abnormalis *	+	....	....	....	....	....	....	....	....	....	....	+	....	....	....
Thesea plecoderma	+	....	....	+	....	....	....	....	....	+	+	+	....	....	....
Acis squamata	+	....	....	+	....	....	....	....	....	....	....	+	+	....	....
Acis spinifera *	+	....	....	....	....	....	....	....	....	....	....	+	....	....	....
Plexaurella japonica *	+	....	....	....	....	....	....	....	....	....	....	+	....	....	....
Villogorgia bruneo *	+	....	....	....	....	....	....	....	....	....	....	+	....	....	....
Ellisogorgia filiformis	+	....	+	+	....	....	....	....	....	+	+	+	....	....	....
Ellisogorgia ramosa *	+	....	....	....	....	....	....	....	....	....	....	+	....	....	....
Metallo indica	+	....	....	....	+	....	....	....	....	....	+	....	....	....	....
Rhipsis bicksoni	+	....	....	+	+	....	....	....	....	....	+	+	....	....	....
Euplexaura pinnata	+	....	....	....	....	....	....	....	....	+	+	....	....	....	....
Acanella normani	+	....	....	....	....	....	....	....	+	....	....	+	+	+	+
Bathygorgia profunda	+	....	....	+	....	....	....	....	....	....	....	....	....	....	+
Corallium paucispinosa	+	....	....	+	....	+	....	....	....	....	....	....	+	+	....
Corallium philippinensis	+	....	....	+	....	....	....	....	....	....	+	....	+	+	....
Melitodes dichotoma	+	....	....	....	....	....	....	+	....	+	....	+	....	....	....
Paragorgia fruticosa	+	....	....	+	+	....	....	....	....	....	+	+	....	....	....
Platycaulus danielssoni	?+	....	....	+	....	....	....	....	....	....	....	....	....	....	....
Leiogorgia beringi *	....	+	....	....	....	....	....	....	....	....	....	....	....	....	+
Calligorgianus pacificus *	....	+	....	....	....	....	....	....	....	....	....	....	+	....	....
Scirpearella gracilis	+	....	....	+	+	....	....	....	....	....	....	+	....	....	....
Scirpearella rubra	+	....	....	+	....	....	....	....	....	....	....	+	+	....	....
Paragorgia nodosa	+	....	....	....	....	....	....	....	+	....	....	....	+	....	....
Paragorgia regalis *	+	....	....	....	....	....	....	....	....	....	....	....	+	+	....

Of the 102 species secured, 96 have been reported from Japanese waters, and 60 are, so far as known, exclusively Japanese. Of the 37 Japanese species known to occur elsewhere 16, or 43 per cent, are from the East Indies; 8, or 22 per cent, are found in the Indian Ocean; 8, or 22 per cent, have been reported from the Hawaiian Islands, and but 1 from Chinese waters.

Four species are common to Japan and the South Seas, and 7 to Japan and the north Atlantic. Four of these latter are found nowhere else except in Japan and in the north Atlantic.

Five species are common to Japan and the north Pacific, including Alaska, and four are common to Japan and the west coast of America.

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It is interesting to note in this connection that there are more species common to Japan and the west coast of North America than to the Hawaiian region and the west coast of North America.[1]

An inspection of the table headed "Bathymetrical distribution" shows that the depth between 100 and 200 fathoms yielded the best results, 45 species being secured from that depth. The depth of from 50 to 100 fathoms appears to come next in order, with a record of 41 species, although a less range of depth is here included than in the 100 to 200 fathom column. A very common source of error in discussing such tables lies in the fact that no attention is ordinarily given to the number of hauls taken in each zone.

An examination of the records shows that alcyonarians were secured from 75 stations during the cruise. A depth of 1 to 50 fathoms is recorded for 8 stations, 50 to 100 fathoms at 22 stations, 100 to 200 fathoms at 14 stations, 200 to 500 fathoms at 18 stations, 500 to 1,000 fathoms at 12 stations, and over 1,000 fathoms at 4 stations. Calculating the number of species to 100 stations in each of these zones, we reach the following result:

In the 1 to 50 fathom zone the rate was 162 species to 100 hauls.

In the 50 to 100 fathom zone the rate was 200 species to 100 hauls.

In the 100 to 200 fathom zone the rate was 333 species to 100 hauls.

In the 200 to 500 fathom zone the rate was 172 species to 100 hauls.

In the 500 to 1,000 fathom zone the rate was 200 species to 100 hauls.

In depths of 1,000 fathoms or more the rate was 225 species to 100 hauls.

This shows still more clearly that the richest grounds were at depths between 100 and 200 fathoms. In order, however, to compare zones of equal depths we should add the 1 to 50 fathom and the 50 to 100 fathom zones, in order to compare with the 100 to 200 fathom zone. When this is done we find that the zone 1 to 100 fathom yielded species at the rate of 183 to 100 hauls, which still further emphasizes the difference between the two; showing that the second, or 100 to 200 fathom zone, yields twice the number of species to 100 hauls that were secured at depths under 100 fathoms.

Below 200 fathoms the ratio is still maintained fairly well, the average being about two species to each successful haul at all depths explored. The number of hauls, however, in the deeper zones was too small to give conclusive evidence. It nevertheless indicates, in a general way, that the bathymetric distribution is more equable than has generally been supposed, and that the deeper zones seem to yield as much in proportion to the number of successful hauls as the shallower, with the exception of the 100 to 200 fathom zone, which seems particularly adapted to alcyonarian life.

[1] A discussion on this point will be found in my Descriptions of Hawaiian Alcyonaria, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 548.

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As before stated, *Helicoptilum rigidum*, representing a new genus and species, was secured at a depth of 2,700 fathoms off Bering Island. So far as the writer has been able to ascertain, this is the greatest depth from which an alcyonarian of any kind has thus far been dredged. This form is also unique among the Pennatulacea on account of its extreme rigidity, being possessed of an exceedingly dense and heavy axis cylinder with a remarkably compact cortex of spicules.

No specimens were secured between the extreme depth just mentioned (2,700 fathoms) and 1,766 fathoms where two previously described species were secured as noted on page 7.

SYSTEMATIC DISCUSSION OF THE ALCYONARIA SECURED BY THE U. S. FISHERIES STEAMER "ALBATROSS" DURING ITS CRUISE IN THE NORTHWEST PACIFIC IN 1906.

Order ALCYONACEA Verrill.

Polyps single or in fixed colonies, without an axis cylinder.

Family CORNULARIDÆ Verrill.

Polyps united by solenia; colonies sometimes forming lobular encrusting masses, sometimes branching through new polyps budding from the sides of older ones.

Genus CLAVULARIA Quoy and Gaimard (modified by Nutting).

Spicules present. Colonies consisting of band-like stolons, from which the polyps arise singly, or of branched forms arising from a stolon-like or encrusting base.[1]

CLAVULARIA DISPERSA Kükenthal.

Clavularia dispersa KÜKENTHAL, Japanische Alcyonaceen, 1906, p. 18.

Colonies growing on very dark-colored worm tubes, broken, the largest fragment being 15 cm. long; but the worm tube is 9.2 cm. longer. The colony rather thinly encrusts the tube, which, with the alcyonarian, is about 4 mm. in diameter. The polyps are distributed without any regularity whatever, sometimes being in clumps or clusters, and at others being as much as 6 mm. apart.

The calyces are tubular or conical, a typical one being 3 mm. in height and about as broad at base as high, their walls filled with rather slender spindles 1 mm. long and longitudinally arranged. Sometimes there are 8 longitudinal corrugations on the calyx walls,

[1] C. C. Nutting, Descriptions of Hawaiian Alcyonaria, Proc. U. S. Nat. Mus., vol. 34, p. 553. In this paper and another on Alcyonaria of the Californian coast (same publication, vol. 35, pp. 681–727) the writer gives short diagnostic definitions of families and genera. In the present work these definitions will be used so far as they appear to the writer to be satisfactory.

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and at others these are not evident. The polyps are often extruded above the calyces, their walls are filled with slender spindles vertically disposed, and are longitudinally corrugated with 8 ridges on which the spindles sometimes assume an *en chevron* arrangement. The tentacles bear numerous minute spindles irregularly disposed over their dorsal surfaces.

The cœnenchyma is packed with slender spindles, like those of the polyps and calyx walls. They are usually vertically disposed, but are sometimes crossed in various directions.

The color of the colonies is light grayish yellow.

Localities.—Station 4992; Bomasiri Shima (off north end of Rebun To), Sea of Japan; 325 fathoms. Station 4985; Kamoi Mizaki Light, N. 17° E., 15.2 miles; 224 fathoms.

Type-locality.—Japan Sea, 1,000 meters.

Apparently near *Sympodium indicum* Thomson and Henderson.[1] These writers describe several species of *Sympodium* which would go into the genus *Clavularia*, as used in this paper.

CLAVULARIA SULCATA, new species.

Plate 1, figs. 2, 2*a*; plate 17, fig. 1.

The largest colony is growing on a worm tube, and is 3.6 cm. in height. The polyps are thickly emplanted over the distal portion of the tube. Another colony grows in a straggling manner over a pebble. The calyces are bent so as to be directed upward.

A typical calyx is 1 cm. in height, club-shaped, 3 mm. broad at the clavate end and 2 mm. broad near its base. The 8 ribs are very strongly marked, and are closely packed with small longitudinal spicules. The margin is 8-lobed, and the polyps are completely retractile, their walls thin and with 8 strongly marked rows of longitudinal and parallel spindles. The general cœnenchyma is packed with stouter spindles than those on the calyces. The tentacles are strongly retracted and do not appear to bear spicules.

The spicules are small spindles, closely warted throughout, rarely attaining a length of over 0.5 mm. They are quite uniform, but vary in diameter, some being almost bar-like.

Color: Yellowish-brown, or tan color throughout.

Locality.—Station 4791; Cape Monati, Bering Island, N. 52° W., 8.75 miles; 76–72 fathoms.

Type-specimen.—Cat. No. 30026, U.S.N.M.

This species resembles *C. petersoni* Kükenthal,[2] but differs in the arrangement of spicules.

[1] Ceylon Pearl Oyster Fisheries Report, The Alcyonaria, 1905, p. 1.
[2] Japanische Alcyonaceen, 1906, p. 16.

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CLAVULARIA EBURNEA Kükenthal.

Clavularia eburnea KÜKENTHAL, Japanische Alcyonaceen, 1906, p. 14.

A specimen secured by the U. S. Fisheries steamer *Albatross* is attached to an alcyonarian stem. The polyps attain but 7 mm. in length. Otherwise they agree with the type.

Locality.—Station 4781; lat. 52° 14′ 30″ N.; long. 174° 13′ 00″ E.; 482 fathoms.

Type-locality.—Sea of Japan, 600–1,200 meters.

CLAVULARIA JAPONICA, new species.

Plate 1, figs. 1, 1*a*; plate 17, fig. 2.

Specimens in fragments. The largest piece is a straight stem or mother calyx, both ends lacking, 5.5 cm. long, from which a number of irregularly placed secondary polyps arise. The main stem (or polyp) shows the even vertical lines of *Telesto arborea*, and is 1.7 mm. in diameter throughout most of its length. The secondary calyces are arranged in an irregular spiral, two in a vertical series being separated by about 6 mm. They grow at an angle of nearly 45 degrees from the stem, are cylindrical in form, 5 mm. in length and 1.6 mm. in diameter. They narrow gradually toward the base, and are truncate at their distal ends. The calycular surface is perfectly smooth, without corrugations, either longitudinal or transverse, except at distal end. Their walls are filled with vertical spindles covered with complex verrucæ which interlock with those of adjacent spicules, forming an even mosaic which it is hard to separate. These are embedded in the superficial layer of the calyces. Within this is another very thin and delicate layer of more slender spindles.

Spicules: These are modified spindles covered with short, variously branched and tuberculate processes, as described above.

Color: The entire specimen is very light yellowish, or cream color.

Locality.—Station 4888; Nomo Zaki, N. 57° E., 16.5 miles; 71 fathoms (type). Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106-95 fathoms. Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms.

Type-specimen.—Cat. No. 30039, U.S.N.M.

Family NEPHTHYIDÆ Verrill.

Colony with a usually sterile stem or trunk which bears a dendritic branching mass of polypiferous ramifications. Polyps not retractile.

Genus LITHOPHYTUM Forskål.

Nephthyidæ in which the polyps are arranged in lappets, and are without "Stutzbundeln" (Kükenthal).[1]

[1] Revision der Alcyonarien, 1903, p. 106.

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LITHOPHYTUM ROSEUM, new species.

Plate 1, figs. 3, 3a; plate 17, fig. 3.

Colony a compact lobulated mass 3.8 cm. in height and with a greater diameter of 3.2 cm. and a lesser diameter of 1.9 cm. The main stem is very short, in the form of a flattened disk. The branches bear closely approximated nodules, oval when viewed from above, and with a larger diameter of 5 mm. on the average; but they are also smaller in many cases. The branches are very short.

The individual calyces are entirely included, looking like those of *Pocillopora*. Their margins form a very slight elevated ring. They are about 1 mm. broad, and the retracted polyps fill them level with the margin. The polyp walls bear eight longitudinal bands of pink spicules vertically arranged, not *en chevron*. The tentacles are short, broad, fringed, and apparently without spicules. The sides and under parts of the nodules bear warty protuberances which may be zooids, but are more likely young polyps.

Spicules: These are minute spindles, usually slender and with regularly disposed verrucæ. Sometimes they are stouter, tending to an oval shape, and, rarely, irregularly branched. Those in the polyp walls are pink, the others white.

Color: The stem is pallid, the retracted polyps and margins of the calyces are pinkish. The general cœnenchyma is whitish.

There are well developed ova in the bottoms of the calyx cavities.

Locality.—Station 5026; lat. 48° 36′ 10″ N.; long. 145° 17′ 30″ E.; 119 fathoms.

Type-specimen.—Cat. No. 30020, U.S.N.M.

Genus DENDRONEPHTHYA Kükenthal.

Nephthyidæ in which the polyps are usually in bundles, and in which the individual polyp is supported by several large spindles constituting the "Stutzbundeln" of German writers.

DENDRONEPHTHYA SPLENDENS (Kükenthal).

Spongodes splendens KÜKENTHAL, Alcyonaceen von Ternate, 1896, p. 104.

Colony a beautifully symmetrical dendroid form 21.5 cm. in height. The sterile stem is 10 cm. high, wrinkled longitudinally throughout and with fine transverse rugosities on its distal end. The stem greatly resembles that of *Ptilosarcus*, and looks as if it were inflatable. The main stem continues throughout the colony to near the distal end, where it forks. The branches are very numerous, short, and tend to an arrangement in whorls. They are sometimes strictly cylindrical and at others much flattened. The younger branches seem to be the round ones, the older flattened. The branches vary greatly in the extent of ramification, some of the larger ones being minia-

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tures of the colony from which they spring, bearing whorls of branchlets which again divide once or twice before the final bundles are reached. Other (younger) branches are very simple, in some cases bearing but one bundle of polyps. There are from three to eight or more polyps in the bundle.

The polyp and pedicel together measure 2.6 mm. in height, on the average. The diameter of the polyp head is about 1.2 mm. The calyx margin is surrounded by a crown of points, some of which project as much as 1.5 mm. beyond the margin. Their number is variable, but eight is quite common. Often two or three of these are the projecting points of spicules in the "Stutzbundeln." Another set of smaller spindles are longitudinally placed on the dorsal surfaces of the infolded tentacles.

Spicules: These are all spindles of various sizes, except stellate forms found in the stem. The largest spindles are on the under surfaces of the twigs, where they sometimes attain a length of 5 mm. These large spindles are quite smooth under a low power, but show a surface closely set with sharp thorny points under a higher power. The stem walls contain sparsely scattered small spicules, cruciform, or irregularly stellate.

Color: The main stem, branches, and branchlets are pallid or whitish, the polyp heads are brownish-red.

Localities.—Station 4879; Oki Shima, S. 70° W., 7.5 miles; 59 fathoms. Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106-95 fathoms. Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms. Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

DENDRONEPHTHYA ACAULIS Kükenthal.

Dendronephthya acaulis KÜKENTHAL, Japanische Alcyonaceen, 1906, p. 40.

The single specimen agrees well with the description and figures given by Kükenthal. I do not find, however, any of the small branched spicules illustrated in fig. 30, *l. c.* Some of the long red spindles from the cœnenchyma of the branches attain a length of over 4 mm.

Locality.—Station 5071; Ose Saki, S. 53.5° W., 2.6 miles; 57 fathoms.

General distribution.—Uragakanal, Japan, 150 meters. (Type-locality.)

Another fragmentary specimen from station 4879, near Oki Shima, 59 fathoms, is referred with doubt to this species. The crown of thorns is much more conspicuous than in the type described by Kükenthal, and the color is a bright red.

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DENDRONEPHTHYA MAGNACANTHA, new species.

Plate 2, figs. 2, 2*a*; plate 17, fig. 5.

Colony small, but 2.1 cm. in height and 1 cm. in width. The stalk is 1.3 cm. long, 3.5 mm. in diameter, and is overlaid with large white, bent spindles vertically disposed. Some of these large spindles are as much as 4.5 mm. in length.

The head consists of a dense mass of heavily spiculated polyps, each consisting of a distinct pedicel and polyp head. The stalk is abruptly bent just below the head so that the tentacles usually face downward. If straightened out, the whole would be about 6 mm. in length; stalk or pedicel, being about 4 mm. in height, and the head 2 mm. high and 2.5 in diameter. The stalk bears on its convex surface a bundle of very strong white spicules about 3.5 mm. long and 2 to 4 in number. The points of one or two of these large spicules usually project beyond the polyp head, and a few shorter spindles are longitudinally arranged on the sides of the stalk; but there are none on the ventral or concave side of the stalk or pedicel.

There is a very strong collaret of curved white spindles below the tentacle bases disposed in one or two circular rows. Often these spindles are bent at the middle so that the convex or upper side lies over the tentacle bases.

The tentacles are armed with bent longitudinal spindles, two of which are usually placed with their proximal ends divaricated (embracing the tentacle bases) and their distal ends approximated so as to form a point directed toward the center of the mass of infolded tentacles. This pair of spicules is usually a little over 1 mm. in length, and is often reenforced by one to three smaller white spindles. The distal ends of the tentacles bear a number of comparatively small, even minute, spindles, irregularly disposed; but tending to be transversely placed near the tips of the tentacles and longitudinally arranged nearer the base.

Spicules: These are all densely tuberculate spindles, many of them unusually stout and heavy, showing white when *in situ*.

Color: The stalk is buffy-yellow, overlaid with white spindles. The polyps are chocolate-brown, overlaid with white spicules.

Localities.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms (type). Station 5070; Ose Saki, S. 8° W., 1.8 miles; 108 fathoms.

Type-specimen.—Cat. No. 30090, U.S.N.M.

This species is very different from any other *Dendronephthya* in the collection, and is quite striking in color, the white spicules being well set off in contrast with the buffy and chocolate color of the stalks and polyp heads.

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DENDRONEPHTHYA NIGRIPES, new species.

Plate 2, figs. 1, 1a; plate 17, fig. 4.

A number of colonies of this form were secured. A typical one is dentritic in its mode of branching and measures 3.5 cm. in height from base of stem, and 2.2 cm. in diameter. The main stem or stalk is terete in form, being 1 cm. in diameter at its broadest part and narrowing both above and below, where it is longitudinally grooved so as to resemble the body of an *Umbellula*. The main branches are flattened, very short, and soon subdivide into several very flat, leaf-like terminal twigs which bear polyps both on their edges and upper surfaces.

The root of the colony is peculiar, being divided into numerous soft, flattened, slender, ribbon-like processes which are almost black except at their distal ends, which are an orange-brown. The whole polypiferous part of the colony is very compactly arranged, so as to present an almost solid mass of polyps on its surface. The canals of the stem extend into the thin-walled root-like processes described above.

The individual polyp heads are borne on slender pedicels, the two together measuring but 2.2 mm.; the diameter of the pedicel being about 0.7 mm., and of the head 1.1 mm.

The spicules of the "Stutzbundeln" do not project conspicuously beyond the polyp head. Those in the polyp walls are arranged loosely *en chevron*, and are strongly marked, being red on a white or creamy background, and the points of the chevron appear as marginal projections over the tentacle bases.

Each tentacle is provided with a pseudo-operculum much as in the Muriceidæ, each tentacle bearing on its dorsal surface two or more long slender spindles reaching nearly to the center of the mass of infolded tentacles, the whole forming a slender-rayed rosette, when viewed from above.

Spicules: These are all slender spindles with fine points over their entire surface, and often bent or sinuous. The largest are found on the under surfaces of the branchlets, where they attain a length of 4 mm. and sometimes extend rib-like from the base to the polypiferous border of the branchlet. These large spicules are interspersed with much smaller but relatively somewhat stouter spindles. The spicules of the pedicels are usually white or yellowish longitudinal spindles, while those of the polyp heads are still smaller, and pinkish in color. The tentacular spindles are colorless.

Color: The peculiar root filaments are dark greenish-brown, almost black. The trunk and branches are white, sometimes tinged with pink. The calyces on some of the branches are white; but in most of them they are pinkish, sometimes tinged with yellowish.

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Locality.—Station 5074; Omai Saki Light, S. 37.5° W., 6.4 miles; 47 fathoms.

Type-specimen.—Cat. No. 30091, U.S.N.M.

This species is not far from *Spongodes pulchra* Thomson and Henderson; but the stem and branch spicules are much larger, and the color of the root processes is so striking that it would be noted by any careful describer.

DENDRONEPHTHYA OVIFORMIS, new species.

Plate 2, figs. 3, 3*a*; plate 17, fig. 6.

Colony ovoid in shape, 3.1 cm. in height, and 2.9 cm. in diameter. The stem is short and stout, being 1.2 cm. in height and terminating below in a small greenish mass of rootlets. The branches are flattened and frilled plates emplanted in two whorls, the lower of which projects outward and downward (thereby concealing most of the stem in side view), while the upper extends outward and upward. Each is divided into short flattened branchlets which bear the polyp bundles. Each bundle consists of from three to eight polyps, a common number being four. The branches of the upper whorl bear branchlets on their surfaces; these support bundles of polyps which fill the upper rounded surface of the colony.

The pedicels are usually quite short and stout for this genus, the pedicel and polyp head together not averaging more than 1.8 mm. in length. The pedicel wall is ornamented with curved red spindles usually diagonally placed and sparsely distributed on the front and sides, usually being transverse on the latter. The backs are strengthened by very large yellowish or pink spindles which are slightly curved and attain a length of 5 mm., projecting as much as 1.7 mm. above the polyp head. The upper parts of the polyps bear small red spindles arranged *en chevron*. Often several large spicules form a bundle with their points appressed and projecting nearly 2 mm. beyond the margin. Besides these there are a number of spindle ends forming a marginal crown, much as in *Acanthogorgia*.

The dorsal surfaces of the infolded tentacles are armed with a row of curved spiny spindles, placed transversely and curving to fit the rounded surface of the tentacle.

Spicules: The spicules of the polyps, twigs and branches are all spindles, the larger ones being comparatively smooth, but bearing very fine spines on their surfaces. They are usually more or less curved, sometimes S-shaped. The bare parts of the stem bear many minute oval or stellate spicules, and sometimes crosses.

Color: The stem, branches, and pedicels are light yellow. The polyps are white, but this color is largely concealed by the pink or scarlet spicules. The root is dark greenish.

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Locality.—Station 4888; Nomo Zaki, N. 57° E., 16.5 miles; 71 fathoms.

Type-specimen.—Cat. No. 30041, U.S.N.M.

Genus PARASPONGODES Kükenthal.

Nephthyidæ, resembling *Dendronephthya* in structure, but having polyps without supporting bundles of spicules. Polyps either single or united in bundles.

PARASPONGODES STRIATA Thomson and Henderson.

Paraspongodes striata THOMSON and HENDERSON, Ceylon Pearl Oyster Report, 1905, p. 277.

Colony arborescent, 6.1 cm. high and 4.5 cm. broad. The barren part of the stem is 2.2 cm. long and 1.8 cm. broad, narrowing above and below. Its proximal end is covered with numerous slender, soft, root-like filaments of a dark greenish-brown color. The branches are in two whorls, those in the lower being contiguous and confluent basally; some branchlets being directed downward and others upward. Except near the bases of the larger branches the branches are all round in section. Branchings up to the fifth order are attained, all branches being very distinctly and regularly wrinkled transversely, resembling trachæary tissue. The polyp bundles are small, as are the individual polyps. The latter are so matted together that it is hard to determine the number in a bundle, probably the average being six to eight. The pedicel and polyp head together are about 2 mm. long, and the head is but slightly broader than the pedicel, the diameter being about 1 mm.

The polyps are terete in form, like grains of wheat. The walls are armed with spindles arranged roughly *en chevron*, and some of them project over the margin. The largest spicules are those in the twigs bearing the bundles, some of these attaining 5 mm. in length. All of these spindles are slender, sinuous or bent, and their surface is covered with closely set spiny points. There are few spicules projecting much beyond the margin. The spicules in the walls of the stem are intricately branched crosses of minute size.

Spicules: These are all spindles of various sizes, but of the type described, and crosses which are profusely branched.

Color: The stem and branches are grayish-white, the polyps dull brown. The rootlets are dull greenish-brown.

Locality.—Station 5071; Ose Saki, S. 53.5° W., 2.6 miles; 57 fathoms.

Type-locality.—Gulf of Manaar.

Family ALCYONIDÆ Verrill (emended).

Colonial Alcyonacea in which the polyps are retractile. The proximal part of the stem is usually devoid of polyps, the cœnenchyma is

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thick, and the spicules abundant. The endodermal canals are not in direct communication with each other.

Genus ALCYONIUM Linnæus (emended by Kükenthal).

Colonies of various forms. Polyps retractile, as are the calyces when evident. Canal system not divided distinctly into inner and outer layers.

ALCYONIUM KÜKENTHALI, new species.

Plate 3, figs. 1, 1*a*; plate 18, fig. 1.

Colony an exceedingly irregular lobulated mass, apparently broken from a much larger specimen. Most of the sterile portion of the stem is missing. The part of the colony present is 8.2 cm. high and 5.3 cm. wide. The opposite flat surfaces seem to have been the upper and lower sides of a flattened lobular branch of the original colony. The lower surface is largely devoid of polyps, and appears to be the naked surface of the very broad fleshy, spongy, main stem. The upper surface and lateral edges of the mass are almost covered with rounded lobes of various sizes averaging about 1.5 cm. broad and 1.1 cm. high. Each is born on a very short, thick, fleshy branch from the main stem. A section of a large branch shows a spongy tissue traversed by very numerous comparatively small canals, with no spicules in the walls between them. The peripheral canals show externally as longitudinal ridges.

The polyps are thickly scattered over the lobes, and are completely retractile, although many of them are fairly well expanded in the specimen described, reaching a height of 2 mm. Their diameter is a little over 1 mm. The polyp walls are ornamented with eight vertical bands of tuberculate spindles, each band consisting of several irregular rows longitudinally placed and extending to the polyp margin. There are a few scattered spindles between these rows. The tentacles are rather long and deeply fringed. They appear to be destitute of spindles.

Spicules: These are very sparse in this species, being confined merely to the rows of spindles just described on the polyp bodies. There are none on the surface of the branches, and they also appear to be absent in the spongy interior. They are nearly all small or minute slender spindles, with well marked verrucæ. There are also a very few minute cruciform spicules and rudely stellate and branched forms.

Color: The whole specimen is a pallid light brown. Another specimen in the same bottle, apparently the same species, has the polyps all completely retracted, and the nodules subdivided or broken up into smaller groups of polyps.

Locality.—Station 5016; lat. 46° 44′ 30″ N.; long. 143° 45′ E.; 64 fathoms.

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Type-specimen.—Cat. No. 30036, U.S.N.M.

Named in honor of Prof. W. Kükenthal, of Breslau, whose admirable work on Alcyonaria has added so much to our knowledge of that group.

ALCYONIUM GRACILLIMUM Kükenthal.

Alcyonium gracillimum KÜKENTHAL, Japanische Alcyonaceen, 1906, p. 34.

A number of specimens in the collection agree well with the original description and figures of this species. The colonies are growing on soft, fleshy tubes which are presumably worm tubes.

The polyps are retractile, but in expansion they raise the surrounding tissue into short calyces with pinkish, warty spindles arranged vertically. The lower part of the exposed polyp has 8 double rows of slightly pinkish spindles arranged *en chevron* and extending upward into 8 longitudinal bands. The basal parts of the tentacles bear transverse spicules.

The spicules are small stout spindles, with comparatively large verrucæ.

Color: Light yellowish-brown.

Localities.—Station 5005; lat. 46° 04′ 40″ N.; long. 142° 27′ 30″ E.; 42–43 fathoms. Station 5006; lat. 46° 04′ N.; long. 142° 29′ E.; 42–43 fathoms. Station 5007; lat. 46° 03′ N.; long. 142° 31′ E.; 42 fathoms.

General distribution.—The type-locality is Misaki, Sagami Bay, Japan.

Genus NIDALIA Gray (emended by Kükenthal).

Colony simple. The sterile and polypiferous portions sharply differentiated. The delicate polyps retractile within nonretractile calyces. Zooids absent. Spicules warty rods and spindles.[1]

NIDALIA RUBRA (Brundin).

Bellonella rubra BRUNDIN, Alcyonarien des zoologischen Museums in Upsala, 1896, p. 6.

Nidalia rubra KÜKENTHAL, Japanische Alcyonarien, 1906, p. 22.

Four specimens from station 4807 agree very well with Kükenthal's description and figures. They are lighter red than those figured by that author; but one, the smallest, is brighter than the others, and is more nearly the color represented by Kükenthal.

Height of colony 3.6 cm. Stem 1.4 cm. long. The diameter of the stem is 7 mm., and of the polypiferous part of the colony 13 mm. The details of the polyps, spiculation, etc., agree well with the description referred to.

[1] This definition is a condensed and abridged translation of the one given by Kükenthal, Japanische Alcyonaceen, 1906, p. 19.

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Locality.—Station 4807; Cape Tsiuka, S. 58° W., 10.3 miles; 44–47 fathoms. Station 4815; Niigata Light, S. 25° E., 21.5 miles; 70 fathoms.

General distribution.—Korea Straits and Tsugaru Straits, Japan (Brundin). Misaki, Sagami Bay, Japan (Kükenthal).

NIDALIA GRACILIS, new species.

Plate 3, figs. 3, 3*a*; plate 18, fig. 2.

Colony unbranched, slender, 8.2 cm. in height. The stem is very short, being but 1.5 cm. long with a diameter of 8 mm., while that of the widest part of the colony is 6 mm.

The stem is forked below and spreads out in lobular processes which are adherent to the two sides of a flat shell, and is both longitudinally and transversely corrugated.

The polyps are more sparsely distributed than in *N. rubra*, often being as much as 3 mm. apart, and scattered over all sides of the rodlike polypiferous part of the colony.

The individual calyces attain a height of about 2 mm. and a diameter of 2.5 mm. at the base. The summit is 8-lobed and the walls contain numerous rodlike spicules which appear like granules under low magnification. These spicules are very small, terete, densely tuberculate spindles.

The polyps are retractile, but many of them are fairly well expanded in the type. The distal parts are expanded so as to appear as if borne on pedicels. The polyp extends 2.5 mm. above the calyx margin, and about 2 mm. of this is included in the tentacular mass, which is about 1.5 mm. in diameter. The polyp walls have a few transversely disposed red spindles at the bottom, eight double rows arranged *en chevron* above these, vertical spindles on the distal part forming vertical bands extending to the tentacle bases. The distal parts of the tentacles show no spicules.

Spicules: These are of two main types. 1. Rather slender but highly tuberculate spindles found in the polyp walls and the general cœnenchyma; 2. Very short, oval, much tuberculated spicules which sometimes intergrade with round, or even stellate, forms.

Color: The stem is yellowish-brown; the general cœnenchyma and sides of calyces rather dull red; the margins of the calyces yellow; and the polyp bodies, below the tentacle bases, yellow, while the polyp head is white.

Locality.—Station 4946; Okiko Jima, N. 31° E., 4 miles; 39 fathoms.

Type-specimen.—Cat. No. 30101, U.S.N.M.

Genus BELLONELLA Gray.

Colony unbranched, rod-like or conical. Calyces largely included, verruciform. Spicules often stars, crosses, and other branched forms.

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BELLONELLA FLAVA, new species.

Plate 2, figs. 4, 4*a*; plate 18, fig. 3.

Colony a single, thick, unbranched, curved stem, 4.4 cm. in height, round, with a greatest diameter of 1.1 cm. The basal nonpolypiferous part is like a turgid collar around the base, 4.5 mm. high and 12 mm. in diameter. The polyp-bearing part is somewhat terete in side view, with a rounded end. The polyps are emplanted on all sides on low rounded eminences averaging about 3 mm. from center to center. The axis of the stem is traversed by large cylindrical cavities, or conspicuous longitudinal canals. The intervals between the rounded eminences, or verrucæ, and the verrucæ themselves are marked by a mesh of wrinkles which checker the whole surface, the wrinkles being mainly longitudinal and transverse. The calyces are marked by eight strong longitudinal lobes or corrugations, ending at the margin which closes over the retracted polyp. The calyces near the margin are 1.5 mm. in diameter; and the infolded margins are lobed, and yellowish in color.

There is a well-marked collaret of small red spindles in several transverse rows. The tentacle bases are armed with similar spindles arranged *en chevron*, and the distal portions of their dorsal surfaces bear three or four rows of similar spindles longitudinally disposed, forming a rosette when the retracted polyp is viewed from above.

Spicules: These are all small, the prevailing types being double heads and double crosses. Sometimes the double heads are flattened so as to resemble the "collar-button" spicules of the genus *Bebryce*. There are a few relatively large slender spindles with sparsely distributed thorny points on their surfaces; these are white and yellow.

Color: General surface dull, light yellow, brighter on the calyces, polyp spicules bright carmine red.

Locality.—Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms.

Type-specimen.—Cat. No. 30089, U.S.N.M.

This species differs from *Nidalia rubra* (Brundin)[1] not only in color, but also in the spicules, particularly those of the tentacles.

Genus ANTHOMASTUS Verrill.

Colony mushroom-shaped, with a thick rounded head on a short round sterile stem. Polyps large and completely retractile. Zooids present, between the polyps.

[1] Alcyonarien aus der Sammlung des zoologischen Museums in Upsala, 1896, p. 6.

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ANTHOMASTUS JAPONICUS, new species.

Plate 3, figs. 2, 2*a*; plate 18, fig. 4.

Capitulum round, 4.1 cm. in diameter. Total height of colony 7 cm., the sterile stem being about 6 cm. in height. The capitulum has its outer edge folded downward so that its edge is 2.2 cm. below its central and highest point. The whole colony is in the shape of a typical toadstool. The stem of this specimen differs from the others, and all other species of the genus thus far described, in having a sharp constriction about 2 cm. from its distal end, below which the stem is produced into a tongue-shaped termination, rounded and even at the end, like many pennatulids. The other specimens end in ragged lobular edges, where the stem has been torn from its support, the one described being the only one that is certainly complete.

The stem measures 15 mm. in greatest diameter. The polyps are about 45 in number, of which about 30 are situated on the edge of the capitulum. The upper surface is much less thickly emplanted. Smaller polyps appear irregularly among the larger ones, the latter measuring 12 mm. to base of tentacles, the tentacles themselves reaching 7 mm. in length. The polyp bodies increase in diameter from below upwards, being in some cases 5 mm. in diameter just below the tentacular bases. The body cavities extend directly to join the stem cavity.

Siphonozooids are densely crowded over the entire upper surface of the capitulum between the polyps, giving it a granular appearance. Under a low power of the microscope they appear as closely packed, rounded, or cone-shaped verrucæ with a pit in the center. Upon dissection these siphonozooids are seen to contain ova.

Spicules: These are almost all needle-like or bar-like forms, nearly smooth, or at least not with pronounced verrucæ, as described in other species of the genus. In the polyps there are a number of minute, smooth, barlike spicules, also minute crosses, stars, and double stars. All spicules smaller than usual in the genus.

Color: The colony is dark red, the polyps somewhat darker. The stem is red above, fading to a grayish-red below. Two specimens from station 5050 were much more brilliant in color than the type, the capitulum and polyps being bright scarlet.

Localities.—Station 4976; Shio Misaki Light, N. 59° E., 6.4 miles; 545–544 fathoms. Station 5043; 42° 10′ 20″ N., 142° 15′ 20″ E.; 330–309 fathoms (type). Station 5050; Kinka San Light, N. 78° W., 25.7 miles; 266 fathoms.

Type-specimen.—Cat. No. 30038, U.S.N.M.

A specimen from station 4976 has a triangular capitulum with large polyps at the corners and a greater diameter of 3.2 cm. One of the polyps is 2 cm. long to the tentacles, and the tentacles are

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1.8 cm. long. The polyp bodies are strongly ridged longitudinally, the ridges extending along the basal part of the tentacles. The zooids have their summits surrounded by circles of small spicules. The color is bright scarlet, the stem being dull grayish. Although this specimen differs considerably from the others, it is doubtless specifically identical with them.

Family SIPHONOGORGIDÆ Kölliker (emended by Kükenthal.)

Siphonogorgidæ KÜKENTHAL, Japanische Alcyonaceen, 1906, p. 69.

Alcyonacea with the general appearance of Gorgonacea. Cœnenchyma hard. Polyps borne only on the ends of ultimate branchlets and retractile within calyces, with their body cavities lengthened into canals which traverse the interior of the branches and contain but four mesenteries.[1]

Genus SIPHONOGORGIA Kölliker.

Being the only genus of the family Siphonogorgidæ, its definition is the same as that given above. It has been abbreviated by Kükenthal.[2] The following is the substance of his definition:

Sarcosoma with little connective tissue except in the canals, which are continuous with the body cavities of the polyps. Calyces with slightly developed opercula.

SIPHONOGORGIA SPLENDENS Kükenthal.

Siphonogorgia splendens KÜKENTHAL, Japanische Alcyonaceen, 1906, p. 80.

A specimen from station 4935 agrees very well with the original description of this species. The colony is 5.5 cm. long; stem quite thick and longitudinally wrinkled, and breaks up 2.3 cm. from its base into three unequal branches. All of the larger branches bear small ultimate branchlets scattered throughout their length; but the distal branchlets are crowded at their ends with bright red polyps.

The calyces vary greatly in size, 3 mm. being a common height. Their walls are supported by strong, usually vertical spicules which are heavily tuberculated and end in a series of blunt, irregular marginal points. They do not project much beyond the calyx margin, however.

The polyps are retractile to their strongly marked collar, which is composed of three or more rows of transverse spindles. The tentacles are armed with a pseudo-operculum much like that in the Muriceidæ, and as figured by Kükenthal.

The spicules are very strongly tuberculate spindles, sometimes reaching 5 mm. in length.

[1] This definition and one for the genus *Siphonogorgia* are condensed and abbreviated translations from the original by Kükenthal.

[2] Japanische Alcyonaceen, p. 69.

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Color: The stem and branches are very light buffy, the polyps bright red, nearly scarlet.

Localities.—Station 4815; Niigata Light, S. 25° E., 21.5 miles; 70 fathoms. Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 4934; Sata Misaki Light, N. 77.5° E., 7 miles; 152–103 fathoms. Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms.

Type-locality.—China Sea.

Another specimen, from station 4935, is much larger, 13 cm. long, and shows the general mode of branching to be irregularly dendritic.

Order PENNATULACEA.

Colonial forms not permanently attached to the bottom, or to other objects. Stem with an axial cavity which is often longitudinally subdivided by thin partitions, and contains an axis cylinder. Spicules needle-like or bar-like, never warty. Both polyps and siphonozooids are generally present.[1]

Family PENNATULIDÆ Kölliker.

Axis and pinnæ present, the latter large, and without calcareous, ray-like bodies. Colony pinnate. Zooids on ventral and lateral sides of the rachis.

Genus PTILOSARCUS Gray.

Calyx with two marginal teeth. Polyps without spicules.

PTILOSARCUS BREVICAULIS, new species.

Plate 4, figs. 3, 3*a*.

A typical specimen from station 4876, preserved in formalin, measures 18 cm. in total length, of which the stem constitutes 5.2 cm. The stem is spindle-formed, being greatly inflated a little above its middle, and greatly constricted just below the rachis and at its lower end. Greatest diameter of stem 2 cm. Diameter just below the pinnæ 6 mm.

This character seems constant in all the specimens secured, and is doubtless due partly to contraction; but nevertheless it is much more pronounced than in *P. quadrangularis*.

The stem is strongly furrowed longitudinally. Rachis very much inflated, and nearly round in section, with the exception of the dorsal and ventral grooves. Its greatest dorso-ventral diameter is 2.5 cm. and the diameter from side to side is almost exactly the same. There

[1] Hawaiian Alcyonaria, Nutting, 1908, p. 557. The definitions of families and genera of the Pennatulacea are mostly adapted from those given by Kölliker in his Anatomisch-Systematische Beschreibung der Alcyonaria, Die Pennatuliden, 1872; and the report on the *Challenger* Pennatulacea, by the same author.

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are 33 pairs of leaves, and their ventral edges are straight, one of the longest having this edge 3 cm. long. The polypiferous border is not nearly so extensively convoluted as in *P. quadrangularis* or *Leioptilum undulatum*, and is about 6 cm. long and rather regularly curved from the ventral end to where it joins the rachis dorsally.

The calyces are in two or three rows on the borders of the leaves. They are small, usually with two opposite marginal points or teeth. In places there appears to be but one wavy row of calyces. The marginal teeth are filled with needle-like spicules, and these descend in bands above the partitions between the leaf chambers that are the continuations of the body cavities of the polyps. These spicules are not confined to a narrow band immediately below the polypiferous border, but are thinly and irregularly scattered along the partitions clear to the base of the leaf. The calyces measure about 2 mm. in height, along the side of the edge of the leaf, and are less than 1 mm. in diameter. They are closely appressed to each other along the border, leaving but their margins elevated above the surface.

The polyps are small, white, and appear to be without spicules.

The zooids are in two very broad turgid bands along the entire length of the rachis, with a narrow median furrow between them, much narrower than in *P. quadrangularis*. Unlike that species, the zooids in the present form extend around between the leaves to the termination of the latter on the ventral surface, entirely covering the spaces between the leaves. The zooids are minute rounded points emplanted thickly, but not contiguous. Each is surrounded by a fence of spicules.

The spicules are small, smooth, sharp needles, characteristic of the family.

Color: The colony is light brownish-yellow. The polypiferous borders of leaves and end of stem somewhat darker. Leaves translucent.

Localities.—Station 4807; Cape Tsiuka, S. 58° W., 10.3 miles; 44–47 fathoms. Station 4808; Cape Tsiuka, S. 61° W., 10.6 miles; 47 fathoms. Station 4876; Oki Shima, S. 29° W., 5.3 miles; 59 fathoms (type).

Type-specimen.—Cat. No. 30013, U.S.N.M.

Genus PENNATULA Linnæus.

The rachis bears zooids on the ventral side only. Spicules scattered over the entire surface, not being confined to the leaf borders.

PENNATULA ACULEATA Danielssen.

Pennatula aculeata DANIELSSEN, Forh. Vid. Sel. Christiania, 1858, p. 25.

A few small specimens from station 4766 are referred with some doubt to this widely distributed and variable species. They may be young colonies.

Length of colony 7.1 cm.; stem 3.4 cm. The stem swelling is long, occupying 1.7 cm. The leaves are in 12 pairs, directed forward,

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lanceolate, slender, opaque. There are five or six polyps to the leaf, one of which forms the leaf termination. Calyces slender, obconical, separate, sometimes 4 mm. long to the end of the teeth, with eight very slender acute teeth or spines projecting 2 mm. beyond the margin.

Zooids: The ventral zooids are very numerous on ventral surface, except on the middle band. Lateral zooids in rows of four or six between leaf bases, really dorsal in position.

Spicules: These are long sharp needles, reddish- or yellowish-white in color.

Color: The colony is grayish-yellow, tinged on leaves with red.

Locality.—Station 4766; Koniuji Island, S. 22.5° W., 27 miles; 1,766 fathoms.

General distribution.—Greatest depth reported, 1255 fathoms. New England coasts. Common on eastern shores of the Atlantic and in the North Sea. Californian coast (Nutting).

PENNATULA SULCATA Kölliker.

Pennatula sulcata KÖLLIKER, *Challenger* Report, the Pennatulidæ, 1880, p. 8.
?*Pennatula fimbriata* HERKLOTS, *teste* H. Balss, Zool. Anzeiger, vol. 34, 1909, p. 428.

Several specimens in the collection agree quite closely with Kölliker's description of this species. In some of these there is a more abrupt swelling on the upper part of the stem than is figured by that writer, and in some the rachis is not twice as long as the stem.

The length of a large specimen is 12.5 cm. The longest pinna is 2.3 cm. in length and its width is 7 mm. There are 20 to 24 polyps on the fully developed leaves, and the calyces are armed with eight points composed of bundles of spicules. The polyps have rather long tentacles, for this genus; and these are deeply fringed, and bear a few very delicate spicules on their dorsal surfaces.

The spicules are colorless, stout needles, borne on the rachis, pinnæ, and calyces. The proximal portion of the stem has the surface filled with minute oval disks.

The zooids are very numerous, there being two very broad, turgid bands on the ventral surface, and these bands are divided by a deep groove. There are also narrow bands of zooids between the bases of the leaves.

Localities.—Station 4934; Sata Misaki Light, N. 77.5° E., 7 miles; 152–103 fathoms. Station 5056; Ose Saki, N. 37° E., 5 miles; 258 fathoms. Station 5092; Joga Shima Light, N. 19° W., 3.5 miles; 70 fathoms.

Doctor Balss identifies this species with *P. fimbriata* Herklots, but does not give any description. The matter of specific differentiation is so far from being reduced to any actual standard, and the views regarding specific characters are so varied, that the writer hesitates

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about reducing an accepted name to the ranks of synonymy unless the evidence is presented.

PENNATULA MURRAYI Kölliker.

Pennatula murrayi KÖLLIKER, *Challenger* Report, the Pennatulidæ, 1880, p. 5.

Total length of colony 12 cm. Stem 4 cm. long, with a sharply defined terete swelling just below the rudimentary pinnæ. The leaves are slender, 22 pairs, lanceolate, 10 mm. long and 3 mm. broad. The calyces are 9 to each leaf, when the latter is fully developed, tubular, much exserted, 2 mm. long, 1 mm. broad; not expanding at the margin, but contracting slightly. The marginal points are much broken in the specimen described, but they do not appear to be regularly 8 in number. The spicules are longitudinally placed on the calyx walls, and are usually nearly parallel. In the leaves the spicules are criss-crossed. The polyps are yellowish, probably yellow in life.

The zooids differ greatly in size, one or two of the ventral series being very large, looking like rudimentary polyps opposite each leaf base. Continuous with these is a broken row or patch of lateral zooids, between the bases of the leaves and running around to the dorsal surface, which, however, they do not invade. The zooids are conical in shape and surrounded by a group of spicules with their distal ends approximated, forming the apex of the cone.

The spicules are red and yellow needles, characteristic of the pennatulids, the longest being about 1.5 cm. long. They are found in the stem, rachis, leaves, and calyces.

Color: The prevailing color is red. The leaves, ventral surface of rachis and basal end of stem, rather dull yellow, as are the polyps. The specimen agrees well with the original description.

Locality.—Station 4934; Sata Misaki Light, N. 77.5° E., 7 miles; 152–103 fathoms.

General distribution.—The type was found by the *Challenger* southeast of Ceram, west of New Guinea, 29 fathoms. Maldives, 43 fathoms (Hickson).

This specimen differs from the original description in the length of leaves, which Kölliker describes as 17 mm. long, instead of 10 mm., as in the specimen described above. In detail, however, the description tallies well.

PENNATULA PENDULA Thomson and Henderson.

Pennatula pendula THOMSON and HENDERSON, Alcyonaria of the Indian Ocean; I, Alcyonaria of the Deep Sea, 1906, p. 118.

The colony is scarlet, total length 10.5 cm. The stem to rudimentary leaves, 3.1 cm., slender, swollen at about its middle and with a moderately distended end bulb. Its greatest diameter is 2.1 mm., and its least diameter, below rachis, 1 mm. There are 15 pairs of leaves from the first that show developed calyces. Leaves triangular

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in shape, a well developed one being 1.5 cm. in length and 4 mm. broad at the base. The leaves are closely approximated, forming a dense tuft or clump at the end of the colony. They overlap on the dorsal surface, being alternate in position. There are eight calyces in a single row on a fully developed leaf, directed outward, forward, and upward.

The individual calyces are tubular in shape, 2.5 mm. high and 1.9 mm. broad at the margin. The margin is ornamented with 8 sharp points composed of a bundle of needle-like spindles with their distal ends approximated. The proximal ends of the same bundles form 8 rather obscure vertical ridges on the calyx walls. Inside of these bundles there are a number of shorter horizontal needles on the upper parts of the walls, and others irregularly disposed on other parts of the walls. Some of the points project as much as 1.5 mm. above the margin.

The polyps are white, strongly retracted, and seem to have a few small red spindles on the tentacles.

The zooids are small, inconspicuous and situated in broken rows, sometimes patches, in the sides of the rachis and between the leaves, there being 12 to 15 in a row. Each zooid shows as a white papilla, minute and surrounded by a fence of spicules.

The dorsal and ventral surfaces of the rachis seem devoid of zooids, although one of the rows may end in a patch of 5 or 6 on the ventro-lateral side.

The whole rachis is covered with red spicules, laid on haphazard. The axis extends nearly to the end of the end bulb.

The spicules are all slender, smooth needles, attaining a length of 2 mm.

The color of the colony as a whole is a bright scarlet. The stem is creamy white, and the polyps white.

Localities.—Station 4958; Mizimoko Shima Light, N. 26° W., 29.3 miles; 405 fathoms. Station 4959; Mizimoko Shima Light, N. 23° W., 28.5 miles; 405–578 fathoms.

Type-locality.—Indian Ocean.

This species is very near to *P. sanguinea* Nutting, which has 6 polyps to the leaf, and the leaves less closely approximated.

PENNATULA NARESI Kölliker.

Pennatula naresi KÖLLIKER, *Challenger* Report, the Pennatulacea, 1880, p. 2.

Colony 40 cm. long, stem 8.5 cm. long, with a strong deeply corrugated enlargement about 1 cm. below the rachis, and a club-shaped end bulb. The rachis is quadrate in section, being laterally compressed. Its dorso-ventral diameter is 5 mm. and from side to side it is 3 mm. There are about 35 pairs of leaves, which are not closely approximated. The individual leaves are sickle-shaped, and

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are often bent backward, outward and inward so that their distal ends almost meet. This is not constant, however, some of the leaves taking an opposite direction, their ends almost meeting on the ventral side of the rachis.

The fully developed leaves are about 3 cm. long, measured around the polypiferous border, and 1.7 cm. directly across from base to tip. Their greatest diameter is 9 mm.

The calyces are curiously distributed, there being a group of 4 or 5 on the proximal end of the pinnule, the others being placed in a zigzag row (sometimes double) along the border, there being 28 or 30 in a full grown leaf. The individual calyces are somewhat hour-glass-shaped, expanding at top and bottom, about 3 mm. high to base of points, and having a marginal diameter of 2 mm. There is a crown of points, the typical number being 8, around the margin. These points are often very unequal in size, and each is composed of a bundle of needle-like yellow spicules with their distal ends approximated. These points occasionally extend 2.5 mm. beyond the margin. Similar spicules are vertically disposed in the calyx walls, tending to form 8 longitudinal bands. A few small red spindles are on the basal parts of the calyx walls.

The spicules of the leaves are smaller and red, criss-crossed and mingled with the yellow ones near the polypiferous zone. The polyps are white, with a few red, curved spicules lying lengthwise on the dorsal surfaces of the tentacles.

The zooids are very numerous and conspicuous, forming yellow bands along the ventro-lateral surfaces, the bands broadening into triangular patches between the bases of the leaves and extending in a line of smaller zooids along between the leaf bases. The zooids in the ventro-lateral bands are the larger, and are surrounded by clumps of yellow spindles.

The spicules are red and yellow, needle-like, smooth spindles, giving their color to the colony, and attaining about 2 mm. in length.

Color: The leaves, distal portion of the stem, and those parts of the rachis not occupied by zooids are rather dull scarlet. The polyps and zooid zones are bright yellow. The lower part of the stem is yellowish.

Localities.—Station 4960; Misimoko Shima Light, N. 19° W., 30.5 miles; 578 fathoms. Station 4973; Shio Misaki Light, N. 82° E., 12.5 miles; 600 fathoms.

Type-locality.—South of Yeddo, Japan; 345 fathoms.

This is one of the most brilliant of all known pennatulids, and must be a gorgeous object when symmetrically expanded.

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PENNATULA LONGISTYLA, new species.

Plate 4, figs. 2, 2*a*.

Colony 9.8 cm. in length and 2.1 cm. wide. The stem is 4.8 cm. long, with a slight, not abrupt, swelling 3 mm. in diameter 1 cm. from the rachis. There is no evident end-bulb. The rachis bears 20 pairs of leaves, which are narrow and straight for this genus, and end proximally in a short twisted pedicel, beyond which the leaf is remarkably uniform in width. The length of a fully developed leaf is 1.6 cm. and its diameter 3 mm.

There are five normal polyps on each leaf, and a rudimentary one on its proximal end.

The calyces lie closely set along the leaf border in a single series overlapping each other and almost parallel to the border. Their length is hard to determine, but appears to be about 3 mm. The calyces are narrow, tubular, and a little over 1 mm. in diameter. The margin bears 8 slender, acute, not very conspicuous points composed usually of but one or two spicules. The polyps are white, with long tentacles fringed with long papillæ which often appear capitate.

The zooids are much as in *Pennatula sulcata* as to distribution, but much larger and more conspicuous. There are two broad bands occupying the whole ventral surface of the rachis except a narrow median groove. The zooids are densely crowded and papilliform, longer than broad, the papillæ being directed toward the distal end of the rachis. These bands extend to and cover the rounded top of the rachis, and broaden between the leaf bases. The lateral zooids are in close set lines extending around below each leaf base to the dorsal surface. They are smaller than those on the ventral bands.

The spicules are small needles, light brownish-yellow in color, on the rachis pinnules and calyces; and shorter, more bar-like needles in the stem.

The color of the colony in general is light yellowish-brown, the stem being lighter than the rachis.

Locality.—Station 4815; Niigata Light, S. 25° E., 21.5 miles; 70 fathoms.

Type-specimen.—Cat. No. 30095, U.S.N.M.

PENNATULA RUBESCENS, new species.

Plate 5, figs. 1, 1*a*.

Colony 12.7 cm. in length, of which the stem is 3.5 cm. The stem has a very slight swelling a little below the rudimentary leaves, and a very slender termination. The greatest diameter of the stem is 2.6 mm., and the least, below the swelling, 1.2 mm.

There are about 40 pairs of leaves, counting the rudimentary ones. They are very slender triangles 1.2 cm. in length and 3 mm.

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in diameter. There are 12 calyces in a single row on each fully developed leaf.

The calyces are tubular, enlarging somewhat at the distal end and with margins armed with 8 distinct sharp points, each point containing a number of red spicules with their distal ends approximated. A number of other spicules, mostly colorless, are embedded in the calyx walls and usually vertical in position. The surface of the leaf contains numerous spicules which are criss-crossed. Ova can be seen in the transparent cœnenchyma of the leaf. The calyces are 2 mm. high and a little more than 1 mm. broad at their margins.

The ventral mid-line of the rachis is deeply grooved.

The zooids differ greatly in size. There is a group of 3 or 4 very large ones on the ventral surface, opposite the base of each leaf and, continuous with these, a patch of 8 or 10 smaller ones extending toward, but not reaching, the dorsal surface. All of the zooids are conical in shape, their walls being beset with red spicules which have their distal ends converging to a point. The ventral surface of the rachis is beset with red spicules criss-crossed and intermixed with colorless ones. The same is true of the dorsal surface.

The spicules are as described above. All are red or colorless needles, rather small. There are few if any on the stem.

Color: The colony is grayish, except that the calyces are bordered with light carmine red, and the rachis tinged with red. This color is also seen in the swelling on the stem. The specimens are much injured and dirty. Originally they must have been very daintily colored.

Locality.—Station 5071; Ose Saki, S. 53.5° W., 2.6 miles; 57 fathoms.

Type-specimen.—Cat. No. 30047, U.S.N.M.

PENNATULA BREVIPENNA, new species.

Plate 4, figs. 1, 1*a*.

Colony very slender; leaves very short, so that the whole affair approaches a virgularian in general appearance. Total length, 35.7 cm. Stem to rudimentary leaves 13 cm., very slender, with a not very well marked swelling the middle of which is 5.3 cm. from the end; and a slender end bulb. Diameter at swelling 3 mm. Least diameter, between swelling and leaves, 1.3 mm.

There are about 65 pairs of leaves, rather distant in proximal part of rachis, and closely crowded on distal part. They are a lengthened triangle in shape, 9 mm. long, in a straight line, and 4 mm. broad at the base. They are alternate in position, and their bases overlap each other on the mid-dorsal surface of the rachis. There are 10 calyces arranged in a single row on each fully developed leaf. The

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individual calyx is a double cone or spindle in shape, the distal end being much longer and more pointed than the proximal; or they might be regarded as flask-shaped, about 2.5 mm. long and 1.5 mm. broad at the basal swelling. The calyx spicules do not project much beyond the margin, but form 8 well-defined vertical bands of small delicate spicules, much less conspicuous than other species of this genus in the collection.

Zooids: There is a very large zooid on the ventro-lateral surface just at the edge of the base of each leaf, consisting of an elevated ring surrounding a relatively enormous aperture. From this a triple row of much smaller zooids passes upward and dorsally along the rachis between the leaf bases, but does not reach the dorsal surface. This row finally becomes a single row of zooids, and near its end is a very small but evident calyx, showing polyp tentacles; a feature not seen before. The zooids have minute spicules in their walls.

Spicules: These are all relatively small colorless needles.

Color: Light grayish-brown throughout, darkening to reddish-brown on end of stem.

Locality.—Station 4948; O Shima Light, N. 11° E., 12 miles; 65 fathoms.

Type-specimen.—Cat. No. 30048, U.S.N.M.

PENNATULA INERMIS, new species.

Plate 5, fig. 3.

Total length of colony, 43 cm.; stem, 7 cm. There is a spindle-shaped swelling with a greatest diameter of 5 mm., 4.6 cm. from the end, which is longitudinally grooved in the preserved specimen, and an end bulb in the shape of a flattened lobe.

There are about 50 pairs of leaves which are rather distant for this group, there being a space of about 3 mm. between adjacent leaves. The individual leaf is strictly triangular in shape, the edges all being nearly straight. The lower edge is 14 mm. in length, the polypiferous border 12 mm., and the attached base 9 mm. The leaf is fleshy and opaque.

The calyces are in two rows, although there appear to be three in places, about 28 to the row. They are tubular in form, and so thin that the polyps appear to be nude. They are 2 mm. in length, the margin being faintly evident as a slightly thickened collar around the polyp. There are 8 dimly outlined longitudinal corrugations. The calyces and dorsal surfaces of the tentacles are encrusted with very short bar-like or oval disk-like spicules.

Zooids: There is a band of ventral zooids on either side of a well-marked ventral groove on the rachis, but quite distant from it. The individual zooids are minute and there are about three rows in each band. The lateral zooids are larger finger-like bodies in rows run-

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ning dorsally and distally from the end of the polypiferous border of each leaf, 6 or 8 in each row, diminishing in size dorsally.

Spicules: Those in the calyces and polyps are different from any others that I know of in these positions in the genus *Pennatula*. They are oval, or very short bar-like forms, very minute, seen with difficulty and apt to be entirely overlooked. They form streaks on the dorsal surfaces of the tentacles and encrust the calycine walls.

Color: The colony is very light yellow, almost cream-colored. The end of stem is reddish-brown.

Localities.—Station 4876; Oki Shima, S. 29° W., 5.3 miles; 59 fathoms (type). ?Station 5072; Omai Saki Light, S. 37° W., 11.7 miles; 284–148 fathoms.

Type-specimen.—Cat. No. 30049, U.S.N.M.

A specimen from the station 5072 has apparently been dried and is therefore hard to identify. It has the general form of this species, however, and the very characteristic form of the spicules described above. The leaf borders are carmine red.

This species bears some resemblance to *Pennatula splendens* Thomson and Henderson [1] especially in the form of spicules.

Genus PTEROIDES Herklots.

Pennatulidæ with well-developed leaves, each of which is supported by thorn-like bony stays radiating outward from its base. Zooids are found on the pinnæ, but not on the rachis.

PTEROIDES SAGAMIENSE Moroff.

Pteroides sagamiense Moroff, Studien über Octocorallien, Zoologische Jahrbücher, Abth. Syst. Geogr. Biol. Thiere, vol. 17, Heft 3, 1902, p. 366, pl. 18, figs. 11–12.

There are several specimens in the collection that agree very closely with Moroff's description of his "specimen No. 2," and especially in the details of his figure 11, plate 18.

The colony is very fleshy, the stem thick and straight, and the leaves straight, and directed upward and forward. On the lower part of the rachis the pinnæ close over and conceal its dorsal surface completely. Their outer edges are reenforced by strong spine-like spicules in a series parallel to the leaf border. Other similar spine-like spicules are radiated from the bases of the leaves toward the polypiferous zone. The ventral surface of the rachis is thick and turgid, and shows a distinct median furrow.

The color of the colony (in alcohol) is livid or whitish with large areas of slaty gray. In one specimen this color covers the dorsal surface of the rachis. In others it simply shows through a whitish integument.

Locality.—Shimizu, Suruga, shore.

[1] Alcyonaria of the Indian Ocean, I, Alcyonaria of the Deep Sea, 1908, p. 117.

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Type-locality.—Sagami Bay, Japan. Type collected by Doctor Haberer.

Genus HALISCEPTRUM Herklots.

Pennatulidæ which bear well-developed leaves devoid of spicules.

HALISCEPTRUM GUSTAVIANUM Herklots.

Halisceptrum gustavianum HERKLOTS, Nederl. Tijdskr. v. Dierkunde, vol. 1, 1863, p. 31.

Colony 13.6 cm. in height; stem, to rudimentary leaves, 3.3 cm., 6 mm. thick with hardly any differentiated end bulb. The rudimentary leaves are very numerous, occupying 3.2 cm. of the rachis, diminishing to a mere slender band below.

The pinnæ are very numerous, closely appressed. The polyps are in several rows on each leaf, very numerous, small, acorn-shaped, the tentacles forming the smaller ends of the acorns. The leaves are convoluted on their polypiferous borders.

The zooids are very numerous on the ventral side of the rachis on either side of a small, sharply distinguished median groove. There also appear to be numerous lateral and dorsal zooids, and a dorsal groove.

The color of the colony is very light brownish, or "pallid" throughout.

Locality.—Station 4808; Cape Tsiuka, S. 61° W., 10.6 miles; 47 fathoms.

Type-locality.—Amoy, China.

HALISCEPTRUM CYSTIFERUM Nutting.

Halisceptrum cystiferum NUTTING, Alcyonaria of the Californian Coast, 1909, p. 698.

Colony 13.8 cm. long. Both the proximal and distal ends of the specimen are missing, leaving 9 cm. of the rachis and part of the stem. The number of polyps to the leaf (4 or 5), as well as their size and shape, agrees well with the original description.

The end of the stem being missing it is impossible to determine whether the characteristic structure, that is, the bladder-like end bulb, is present in the specimen or not.

Locality.—Station 5015; lat. 46° 44′ N.; long. 144° 02′ F.; 510 fathoms.

Type-locality.—Off Point Pinos, California, 394–609 fathoms.

HALISCEPTRUM ALBUM, new species.

Plate 5, figs. 2, 2*a*.

There are two specimens in the collection, one consisting of the proximal and the other of the distal part of colonies of this species, and the following description is a composite of the two, as they very nearly supplement each other.

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Combined length 31 cm. Stem to rudimentary leaves 5 cm., with a spindle-shaped swelling with its widest part 3.5 cm. from its end, 8 mm. in diameter. There is no distinct end bulb, but the end is curved. The axis is hard, stony, and quadrangular in section, reaching to within 12 mm. of the end of the stem, hard and unyielding to the end. Part of the fleshy part is stripped from the axis in both specimens, but is still attached by the fleshy cœnenchyma. There are approximately 50 pairs of leaves, but some of them are so matted together that their number is hard to determine.

The individual leaves are broad, and their borders so frilled that their true shape is hard to determine. They are broadly triangular, with a much curved and frilled border. Length of fully developed leaf 1.8 cm.; greatest width 2 cm. The polyps are arranged in single rows at the two ends of the leaf, and in two or three rows throughout the median portions of the polypiferous border. They are so soft and matted together that it is almost impossible to count them without separating them one by one; but there are from 45 to 50 in a fully developed leaf.

The individual calyx is slender, tubular, gradually enlarging toward the margin, where it ends in eight rounded finger-like lobes which might be mistaken for contracted tentacles. These lobes are continued downward, narrowing as they go, into faintly defined perpendicular ridges running the entire length of the calyx wall. The calyces are about 3 mm. in length and 2.8 mm. in diameter at the margin. The polyps are well retracted, only their massed tentacles showing above the calyx. The walls of the leaves are translucent, and the septa and mesenterial filaments can be seen to the bottom or stem part of the leaves.

Zooids: The ventral zooids are numerous, in two broken series, bordering an impressed line along the mid-ventral surface. From these rows the lateral zooids run in single rows around between the leaf bases, but do not extend to the dorsal surface. This is bare of zooids, and seems to correspond to the ventral surface of *Ptilosarcus*, for instance.

Spicules: There are no spicules in leaves, polyps or cœnenchyma of rachis. Near the end bulb of the stem, however, there are numerous minute calcareous particles embedded in the cœnenchyma. They are exceedingly irregular, and seem to have no characteristic shape.

Color: The entire colony is very pale yellowish-brown.

Localities.—Station 4817; Niigata Light, S. 29° E., 18 miles; 61 fathoms (distal part of the colony), type. Station 4876; Oki Shima, S. 29° W., 5.3 miles; 59 fathoms (proximal part of colony).

Type-specimen.—Cat. No. 30092, U.S.N.M.

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Although the presence of spicules would seem to indicate that this species should be placed in the genus *Pennatula*, the general appearance, and absence of spicules from nearly the entire colony seems to justify assigning it to *Halisceptrum*.

Family VIRGULARIDÆ.

Colony slender; pinnæ short, often reduced to a band and without a plate of spine-like spicules at their bases.

VIRGULARIA, species?

A specimen belonging apparently to this genus, but in too poor condition, and too fragmentary to admit of satisfactory description, was secured at station 4947; Okiko Jima, N. 17° E., 4.4 miles; 51 fathoms.

Genus BALTICINA Gray.

Stem thick; rachis very long in proportion to stem; pinnæ reduced to band-like rows of calyces; spicules in the tentacles of the polyps.

BALTICINA FINMARCHICA (Sars).

Virgularia finmarchica SARS, Fauna Lit. Norvegiæ, vol. 2, 1856, p. 68.

Colony 152 cm. in length; stem 53 cm.; end bulb and swelling confluent and 15 cm. long and with a greatest diameter of 2.8 cm. and least diameter of 8 mm. Stem and rachis dorso-ventrally flattened. Greatest diameter of rachis, with leaf bands, 1.7 cm.; lesser diameter, at same point, 1.2 cm. There are 237 polyp bands, with 11 or 12 polyps to each band. Exposed portion of bands 5 mm. broad. The bands are oblique and closely appressed, meeting on dorsal surface of rachis. The ventral surface of the rachis is entirely bare.

The calyces of a given row are adherent to each other at their margins. Each has two spine-like or horn-like processes projecting from the two sides of the exposed surface. These, as well as the calyx walls, are leathery, without any external evidence of spicules. The calyces decrease in size from the dorsal to the ventral surface of the rachis, and are packed full of ova.

Zooids: There is a row of rounded verruciform zooids between adjacent leaves. Each row spreads into a patch of scattered zooids on the ventro-lateral surface between the leaf endings. The row and patch combined contain about 15 zooids.

Spicules: There are no spicules in calyces or polyps; neither have I found them in other parts of the colony, except a few amorphous calcareous particles.

Localities.—Station 4983; Benkei Mizaki Light, S. 2° E., 12 miles; 428 fathoms. Station 4998; lat. 47° 39′ 10″ N.; long. 141° 31′ 40″ E.; 66 fathoms. Station 5047; Kinka San Light, N. 69.5°, 11.6 miles; 107 fathoms.

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Type-locality.—Oxfjord, Finmark.

In one specimen the polyps are sometimes 15 in a row; otherwise the specimen agrees with the description given above.

This species appears to the writer to be identical with the one called *Verrillia blakei* Stearns, and redescribed by the writer in his Alcyonaria of the Californian Coast, 1909, page 706, where a discussion of the synonymy will be found.

These specimens agree so closely with the figures and descriptions of *Balticina finmarchica* (Sars) that I assign them to that species in spite of the apparent absence of spicules from the tentacles.

BALTICINA PACIFICA Nutting.

Plate 6, fig. 4.

Balticina pacifica NUTTING, Alcyonaria of the Californian coast, 1909, p. 704.

Colony 47 cm. in length, of which the stem is 15 cm. In some specimens there is a greatly distended swelling on the stem; in one case 7 mm. thick and over 5 cm. long, while the least diameter of the stem below the rachis is but 1.7 mm. In the specimen described, however, the swelling is less distended than the end bulb, although this may be partially due to shrinking.

There are about 94 rows of polyps, 2 or 3 to a row, on each side. In the lower part of the rachis there is but one polyp to represent each row; higher up there is one large outer one and a rudimentary inner one; still higher a third, innermost one appears, and in the fully developed rows there are three of about equal size. The rows are quite oblique and are all on the latero-ventral surface, leaving the whole dorsal surface bare.

Each calyx has two sharp spines projecting from its outer margin, the spines being filled with needlelike spicules which also extend to other exposed parts of the calyx walls. The inner margin of the calyx is not differentiated from the polyp body, and lies snugly against the stem. The height of a typical calyx is about 3 mm., and the diameter is 2 mm. The tentacles have their dorsal surfaces covered with very numerous barlike spicules in many parallel rows. In one specimen the body walls of the polyps are greatly distended, and form sacklike transparent protuberances on the inner, or stem side, of the polyp.

Zooids: The zooids are very few and inconspicuous and irregular in distribution, appearing as whitish dots sparsely distributed on the ventral surface. The lateral zooids are in an irregular row or patch of 5 or 6 between adjacent polyp rows.

Spicules: These are numerous, being quite abundant in both polyps and calyces. They appear to be wanting elsewhere. The axis cylinder in the rachis is round in section, and smooth.

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Color: The polyps are reddish-brown and the rachis light yellow. The end bulb is reddish-brown.

Localities.—Station 4768; lat. 54° 20′ 30″ N.; long. 179° 09′ 30″ E.; 764 fathoms. Station 4792; Cape Monati, Bering Island, N. 50° W., 8.2 miles; 72 fathoms. Station 4985; Kamoi Misaki Light, N. 17° E., 15.2 miles; 224 fathoms. The specimen described came from this station. Station 5031; lat. 44° 04′ 00″ N.; long. 145° 32′ 00″ E.; 86 fathoms.

Specimens from station 4792 had the tentacles expanded, and their dorsal surfaces were marked by clear-cut white lines of silvery spicules.

General distribution.—The type-locality is off the Californian coast.

BALTICINA CALIFORNICA (Moroff).

Pavonaria californica MOROFF, Studien über Octocorallien, Zoologische Jahrbücher, Abth. Syst. Geogr. Biol. Thiere, ser. 5, vol. 17, Heft 3, 1902, p. 393.

Length 97.5 cm., stem 32 cm. There are 115 polyp rows, polyps 3 to 5 in each row. There are spicules in the two teeth on the margin of each calyx. The tentacles are without spicules, the characteristic feature of this species.

The polyps are reddish-brown.

Localities.—Station 4984; Benkei Mizaki Light, S. 3° W., 15 miles; 248–224 fathoms. Station 4986; Benkei Mizaki Light, N. 35° E., 15 miles; 172 fathoms.

General distribution.—The type-specimens were presumably from the Californian coast, although this fact is not noted in the original description.

This species may be the same as the last, but the absence of tentacular spicules is a character which, if constant, would be a good specific character. Both specimens in this collection have parasitic or symbiotic astrophytons attached to them.

Genus HALIPTERIS Kölliker, modified by Jüngersen.[1]

Calyces with 2 to 4 teeth; zooids lateral.

HALIPTERIS CHRISTII (Koren and Danielssen).

Virgularia christii KOREN and DANIELSSEN, Nyt Magazin for Naturvidenskaberne, vol. 5, 1848, p. 269.

Halipteris christii KÖLLIKER, Anatomisch-Systematische Beschreibung der Alcyonaria, I, Die Pennatuliden, 1872, p. 249.

Length of colony 12 cm. Stem 3.2 cm., very slender, with no evident swelling, and a very slender and inconspicuous end bulb. The calyces are arranged in a single zigzag row, or double row,

[1] This genus is here placed in the family Virgularidæ, instead of the Protoptilidæ, on account of the argument presented by Jüngersen in Danish Ingolf Expedition, vol. 5, 1904, p. 45. This writer, however, institutes the family Pavonaridæ, in which he includes *Halipteris*. He finds that the genus *Stichoptilum* of Grieg represents merely the young stages of *Halipteris*.

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according to interpretation. The well developed calyces are further from the mid-dorsal line than the developing calyces, which lie in such a way that each developing calyx is supported as it were on its lower and outer side by a full-grown one. A well developed calyx is 2.3 mm. high on its outer side, and reduced to almost nothing on the side next the rachis; and about 1.5 mm. in diameter. Its walls are filled with vertical needles which project in conspicuous points beyond the margin. Some of them have two very large points and others four smaller ones. Still others have no regular points. On the proximal part of the rachis there is but a single row of calyces on each side. Many of the developing calyces have their distal portions pointed, the spicules closing over the apertures by meeting at the apex of a cone.

The polyp tentacles have each a broad band of several rows of vertically disposed barlike spicules which are very conspicuous.

Zooids: The zooids are smooth, brown, yellowish bodies, quite distant from each other. The plan of distribution seems to be, one on the inner and dorsal, and another on the latero-ventral side of each calyx base; but this order is not constant, although there are generally two to each calyx.

Spicules: These are of two general types. The ordinary needle-like form in the calyces and general surface of the rachis, and the barlike spicules seen in the tentacles.

Color: The stem is very light straw color; the calyces have a faint pinkish or purplish tinge due to the showing through of the dark brown bodies of the polyps. The tentacles are whitish.

Locality.—Station 4984; Benkei Mizaki Light, S. 3° W., 15 miles; 248–224 fathoms.

General distribution.—Type-locality, Lofoten, Norway. Also reported from Tynemouth, England.

The specimens in the collection agree in essentials with the definition of the genus *Stichoptilum* Grieg, which Jüngersen regards as the young of *Halipteris*. From the latter author's discussion, I regard this specimen as the young of *Halipteris christii*.

Family UMBELLULIDÆ.

Polyps very large, without calyces and borne in a cluster at the end of a very long and slender stem.

Genus UMBELLULA Lamarck.

Being the only genus in the family, it bears the characters of the Umbellulidæ.

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UMBELLULA MAGNIFLORA Kölliker.

Umbellula magniflora KÖLLIKER, *Challenger* Reports, the Pennatulida, 1880, p. 24.

Five fine specimens in an excellent state of preservation and all evidently of the same species, afford an interesting study in the variations in measurements of this beautiful *Umbellula*. The series was arranged with reference to the size of polyps.

Specimen No.	Total length.	Rachis and polyps.	Polyps.	Tentacles.	Number of polyps.
	Cm.	*Cm.*	*Cm.*	*Cm.*	
1	51	9.3	4.9	2.8	21
2	83	5.0	3.8	Absent.	10
3	53	5.3	2.9	1.6	9
4	54	5.0	2.4	1.2	8
5	80	5.5	2.3	1.5	9

No. 1 is a distinct pinkish salmon in color, except some of the polyp bodies which are a reddish brown. This color is superficial, however, and is easily rubbed off.

Nos. 3, 4, and 5 are almost white, with a slight pinkish cast, tending to a light salmon in the pinnules.

These measurements seem to show that there is no relation between the age of the colony, as indicated by the number of polyps and the length of the stalk. There seems, however, to be a general relation between the size of the polyps and the number on a colony.

Aside from being much larger, the polyps of No. 1 are much more fully expanded than those of the other specimens.

The following additional facts were noted regarding specimen No. 1:

There is a distinct swelling above the end bulb, 1.2 cm. in diameter, the least diameter of the stem being 2 mm. The polyps are fully extended and increase from 2.5 mm. in diameter near the distal end to 6 mm. near the base. The polyp walls are smooth and semi-pellucid, the mesenteries showing plainly through them. There are a number of shallow corrugations disposed in an annular manner around the upper part of the body walls.

There are about 34 pairs of long, filiform pinnules in each tentacle.

The zooids are very numerous, covering the rachis where not occupied by the polyps. Those on the rachis do not regularly have tentacles and appear to the naked eye as rounded granules. Under magnification they show a central mouth. On the lower part of the stalk they are smaller, but each has a long unbranched tentacle. Although rubbed off in places, they were undoubtedly originally emplanted on all parts of the stalk.

There were no spicules found in these specimens.

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Locality.—Station 4975; Shio Misaki Light, N. 49° E., 7 miles; 712 to 545 fathoms.

General distribution.—The type-locality is in the South Sea, east of Kerguelen Island, 1,600 fathoms. Hawaiian region, 216–438 fathoms (Nutting).

UMBELLULA CARPENTERI Kölliker.

Umbellula carpenteri KÖLLIKER, *Challenger* Reports, the Pennatulida, 1880, p. 23.

Two specimens, both female with ova, were secured at station 5080; 505 fathoms.

The larger specimen is 75 cm. in length, the head measuring 5 cm., polyp bodies 2.4 cm. long, and the tentacles 1.6 cm. The swelling above the end bulb is 6 mm. wide, and about 4.3 cm. long. The stem is very slender, its least diameter being 1.2 mm.

There are 8 polyps, almost white, with 8 longitudinal corrugations. The tentacles are smooth, their dorsal surfaces colorless, the rest of the tentacles and pinnules being very light salmon. The pinnules are about 30 in number.

The zooids are numerous and many of them bear single tentacles, usually unbranched. There are very few calcareous particles, even in the end bulb.

The smaller specimen also has 8 polyps and agrees more nearly with Kölliker's measurements. The details are much the same as in the other specimen.

Localities.—Station 5080; Omai Saki Light, N. 23.5° E., 28 miles; 505 fathoms. Specimens collected at station 5015, lat. 46° 44′ N.; long. 144° 02′ E., 510 fathoms, are apparently of this species.

General distribution.—Type-locality, South Polar Sea, southwest of Australia, 1,975 and 1,950 fathoms. Hawaiian region, 595 to 1,124 fathoms (Nutting).

UMBELLULA ELOISA, new species.

Plate 6, figs. 3, 3*a*.

Total length of colony, 73 cm. Head, including enlargement of stem, 7 cm. The lower part of the stem has no very evident end bulb, but terminates in a bent, club-shaped end, which is continuous with the stem swelling. The greatest diameter of the swelling is 6 mm; the least diameter of the stem, 2 mm. The beginning of the enlargement of the rachis to the base of the polyps is 1.9 cm., the diameter of the rachis just below the polyp bases being 1.5 cm. The polyps are very large, 14 in number, 7 in an outer whorl and 7 within. The length of the largest polyp to tentacle bases is 2.4 cm. The tentacles are much shrunken and are 1.7 cm. in length, making the whole length of tentacles and polyp 4.1 cm. This is the largest alcyonoid polyp that the writer has seen.

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The polyp bodies are not regularly corrugated as in many species of the genus, but have a tough leathery surface, with a few irregular wrinkles due to shrinking. Polyps of a dull purplish color below, livid above, this color extending along the greater part of the dorsal surface. The tentacles are erect, more rigid than usual, their inner and lateral surfaces being deep purplish-brown, as are the distal parts all around. The pinnules are about 24 on each side, their dorsal sides livid, the rest purplish-brown. Their bases are overlaid with comparatively large, bar-like colorless spicules, most of which are longitudinally disposed. Some of them are over 1 mm. in length.

Very large, bar-like spicules, some of them 2.5 mm. long, are embedded in the tough cœnenchyma of the tentacle bases, a group of several being longitudinally disposed along the proximal dorsal part of each tentacle and reaching to the pinnules.

The general integument of the polyps, rachis, and stem is filled with minute calcareous bodies of an oval or biscuit shape, which are too small to be seen with the unaided eye.

The zooids are very numerous, but small and inconspicuous. They surround the polyp bases and extend downward in ill-defined triangular patches nearly to the bottom of the swelling below the rachis. They are also scattered between the polyps on the rachis; but the polyps are so compactly crowded on the rachis that there is but little room left for zooids.

The whole head is so symmetrical that one can not tell without dissection whether there is a terminal polyp or not.

Spicules: These have been described. Some of those on the tentacle bases are by far the largest that I find mentioned as found in the Umbellulidæ, except in *U. durissima* Kölliker.

Color: The stem is grayish, end-swelling and bulb yellowish-brown; basal parts of polyps reddish-brown or dull purplish, distal parts of bodies and dorsum of tentacles to near tips livid. The rest of the tentacles and most of the pinnules are rich purplish-brown, almost a wine color.

Locality.—Station 4973; Shio Misaki Light, N. 82° E., 12.5 miles; 600 fathoms.

Type-specimen.—Cat. No. 30009, U.S.N.M.

This is the finest *Umbellula* that the writer has seen. It may possibly be *U. durissima* Kölliker, which it resembles in spiculation and color; but it can not be placed here until intergrading specimens are found.

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Family KOPHOBELEMNONIDÆ.

Polyps in distinct rows or series on both sides of the rachis, large, sessile, and not provided with calyces. Rachis elongated in comparison with the Umbellulidæ.

Genus KOPHOBELEMNON Absjornsen (modified).

Polyps not symmetrically in pairs; spicules abundant.

KOPHOBELEMNON FERRUGINEUM Kölliker.

Kophobelemnon ferrugineum KÖLLIKER, *Challenger* Reports, the Pennatulida, 1880, p. 16.

Colony 9.5 cm. in length, of which the stem is 4.7 cm. The end bulb is evident and swollen in the form of a clavate knob. Greatest diameter of stem, near distal end, 6 mm.; between end bulb and swelling, 4.5 mm.; end bulb, 7 mm. The rachis has a pointed termination.

The polyps are large, partially retractile, irregularly distributed on the dorsal and lateral surfaces of the rachis, very much shrunken and distorted. The polyp bodies are almost entirely included or retracted in the specimen. Visible wall, 3 mm. long, 4 mm. in diameter and rudely corrugated vertically. The tentacles are 5 mm. long, each having a dorsal ridge or sharply defined longitudinal crest, packed with needles which are both longitudinal and criss-crossed, showing as a white band and sending branches to dorsal surface of each pinnule.

There are about 18 pinnules on each side. The sides of the tentacles, below pinnules, bear transverse needles, but the mid-ventral line of the tentacles is almost free.

Zooids: These are closely and evenly packed over the entire surface of the rachis which is not occupied by polyps. They are comparatively large, conical, with their distal ends pointed outward and upward, their walls filled with needles usually tending to a vertical position.

Color: The colony is grayish-brown, the inner sides of the tentacles dusky brown.

Spicules: The entire surface is packed with needles.

Locality.—Station 4990; lat. 43° 40′ N.; long. 140° 58′ E.; 200 fathoms.

Type-locality.—South of Yeddo, Japan, 345 fathoms.

The specimen agrees fairly well with Kölliker's exceedingly brief description.

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KOPHOBELEMNON HISPIDUM, new species.

Plate 6, figs. 2, 2a.

The colony is 7.8 cm. in length. The stalk is short and not sharply distinguished from the rachis, broadened immediately below the polyps, where it is 1.5 cm. wide in front view, but only 4 mm. thick from front to back. Its proximal end is broadened and truncated, the leathery integument with which it is covered being tucked in at the end as if partly involuted. The narrowest part of the stem is immediately above the end bulb, where it is round and 4.5 mm. in diameter, and its surface is covered with numerous small needles, giving it a hispid appearance, which suggests its specific name.

The polyps are three in number, almost in line above the flattened rachis, the middle one, however, being distinctly higher than the lateral ones, which are on the same level. They are much shrunken and distorted, the bodies being narrower below and broadening to 5 mm. at the tentacle bases. Height to tentacles 1.2 cm. Tentacles 1.6 cm. long, laterally compressed. There are 16 pinnules which are very slender, round in section, and covered on back and sides with a close felting of longitudinal spicules so closely packed as to completely cover the surface. The tentacles are also covered on all sides with these slender needles.

The zooids are low, verruciform bodies, often showing a central aperture. They are regularly distributed on all exposed parts of the stem and rachis. Their walls are filled with the same needle-like spicules that cover the entire colony. They are vertically arranged in the walls of the zooids, with their points converging toward the margins.

Spicules: These are all slender needles, or rather slender rods with rounded ends. They are seldom over 1 mm. in length.

Color: The colony is gray, excepting the tentacles, which have a brownish tinge.

Localities.—Station 4956; Mizunoko Shima Light, N. 22° W., 33 miles; 720 fathoms (type). Station 4977; Shio Misaki Light, N. 65° E., 7 miles; 544 fathoms.

Type-specimen.—Cat. No. 30094, U.S.N.M.

This form greatly resembles one that the writer has described as *Umbellula*, sp.?[1]

Family ANTHOPTILIDÆ Kölliker.

Pennatulids bearing free, sessile polyps. Calyces absent.

[1] Nutting, Hawaiian Alcyonaria, 1908, p. 565.

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Genus ANTHOPTILUM Kölliker.

Polyps large, disposed in numerous short rows. Rachis without a streak of undeveloped polyps below the developed ones. Zooids may be on all sides of the rachis. Spicules, if present, confined to the proximal end of stalk.

ANTHOPTILUM MURRAYI Kölliker.

Anthoptilum murrayi KÖLLIKER, *Challenger* Reports, the Pennatulida, 1880, p. 14.

The colony is 44 cm. in length, of which the stalk is 5.1 cm. The stem has a distinct enlargement just below the rachis and diminishes gradually in size to the end bulb, the two being almost of the same size and insensibly blending into each other. The diameter of the swelling is 8 mm. and of the end bulb 5.5 mm. The narrowest part of the stem is between the two and is 4.5 mm. broad. The swelling has a series of very evident wrinkles or longitudinal furrows.

The polyp bodies are tubular, transversely wrinkled or corrugated, 6 mm. high to the bases of the tentacles, 2 mm. in diameter at the middle, diminishing slightly in diameter at each end. The tentacles are 5 mm. long, not longer than body in specimens studied. The pinnules are numerous. The polyps are very irregularly distributed, perhaps an average distance between them is 5 mm. They can hardly be said to be arranged in transverse rows, the midline, ventrally, being occasionally invaded by polyps, though in general it is free. On the proximal part of the rachis the polyps are scattered singly or in pairs; on the distal portion they are more crowded and generally occur in pairs or in short oblique rows of three. At the distal end they are crowded into a dense tuft, in the larger and older specimens, and their arrangement is hard to ascertain, the lateral and ventral surfaces of the rachis being entirely covered with polyps.

The ventral midline is covered, and the mass of polyps is as dense as in *A. thomsoni* Kölliker. The bases of the polyps in a given line are often slightly coherent.

Zooids: These are small and numerous, and are scattered over pretty much the whole surface of the rachis, except the ventral region, which is not occupied by a furrow and is rarely invaded by zooids. There is a narrow dorsal band, sometimes depressed, which is usually free from zooids but is occasionally invaded. The zooids are unevenly distributed, sometimes forming patches or lines, and at others scattered haphazard. They are all small.

The spicules are absent. While there are a few calcareous particles on the end bulbs, I am not sure that they are not adventitious.

Color: The upper part of the stem, the rachis, and lower parts of the polyps are pale yellowish, with a reddish-brown tinge. The upper parts of the polyps and the tentacles are warm reddish-brown, the

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former darker, sometimes a purplish-brown. The swelling and end bulb a light reddish-brown.

Localities.—Station 4765; West Point Yunaska Island, S. 37° E., 43.5 miles; 1,217 fathoms. Station 4973; Shio Misaki Light, N. 82° E., 12.5 miles; 600 fathoms.

General distribution.—The type-locality is North Atlantic, south of Halifax, 1,250 fathoms, Hawaiian region, 233 fathoms (Nutting). Indian Ocean, 1,000 fathoms (Thomson and Henderson).

The specimens from station 4973 are in very poor condition and may possibly be incorrectly identified.

Family ECHINOPTILIDÆ Hubrecht.

Small, pennatula-like forms in which the axis cylinder is wanting.

Genus ECHINOPTILUM Hubrecht.

Being the only genus of Echinoptilidæ, it has the characters of the family.

ECHINOPTILUM MACINTOSHI Hubrecht.

Echinoptilum macintoshi HUBRECHT, Proc. Zool. Soc. London, 1885, p. 512.

Colony 9.2 cm. in length, curved in a semicircle, the end bulb more sharply curved in the same direction. The stem, below rudimentary polyps, about 3 cm. long, decreasing gradually in diameter from 7 mm. to 4.5 mm. near the rather sharply pointed end. Greatest diameter, across rachis, 9 mm. The rachis is round or obscurely quadrangular in section, with a distinct groove on the concave side. The polyps are arranged in vertical rows, about 20 to a row, and also in oblique transverse rows of 6 to 7 from mid-dorsal to mid-ventral surface. Polyps 3.5 mm. long, on outer side, to top of spines.

Each calyx margin bears two strong spines composed of groups of spicules which sometimes project as much as 1.5 mm. above the margin. Calyces about 2 mm. broad at base, narrowing to the margin. The calyces are smallest near the groove and lower rachis.

Zooids: These are scattered plentifully between the calyces, being absent from the groove only.

Spicules: These are all sharply pointed needles, characteristic of the pennatulids.

There is no axis cylinder.

Color: Rather dull pink throughout, the color of the needles.

Locality.—Station 4842; Saigo Misaki (Dogo Island), S. 64° W., 6.1 miles; 82 fathoms.

General distribution.—The type was from the Japanese Sea, 71 fathoms. The species has also been reported from the Hawaiian Region (Nutting).

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Family PROTOPTILIDÆ Kölliker.

The rachis is long and slender; polyps sessile, in a single irregular series on each side; calyces present.

Genus PROTOPTILUM Kölliker.

Zooids on all sides of the rachis, leaving nothing but the ventral line uncovered.

PROTOPTILUM ORIENTALE, new species.

Plate 6, figs. 1, 1*a*.

Colony 13.3 cm. in length; stem to first rudimentary polyp 6.3 cm., ending in an ovoid, bladder-like end bulb which is longitudinally striated and measures 11 mm. by 7 mm.

The least diameter of the stem above end bulb is 2.5 mm.; median diameter 3.5 mm.

There is a row of polyps along each side of the dorsal median space, about 10 polyps in each. The calyces are short, directed distally, with the inner walls very short or lacking. The outer wall is 3 mm. high, and with 8 regular, large, vertical corrugations ending in lobular projections around the margin, covered with small needle-like spicules. The polyps are partly retracted, exposing but about 2.5 cm. of their length. They are 2 mm. in diameter, and their bodies are covered with an armature of very conspicuous spicules which are bar-shaped with the ends enlarged. They lie in every direction in the body walls, and average about 1 mm. in length. The tentacles are about 3.5 mm. long, and have their dorsal surfaces covered by triple or double rows of the same spicules placed longitudinally and very conspicuous. The pinnules are short and rather distant.

There is a row of rudimentary polyps, 17 in one specimen and but 4 in another. The spaces between the lateral calyces, margin to margin, are about 5 mm.

Zooids: The ventral zooids are in two regular rows, one on each side of the dorsal surface, very regularly spaced. Opposite each of the calyces these rows become double. Sometimes there are one or two on the outer side of the base of each calyx, and there are often one or two opposite the inner margin. The zooids are conical or dome-shaped, with distinct apertures. They bear small needle-shaped spicules in their walls.

The rachis ends distally in a blunt, rounded point projecting 3.5 mm. above the last calyx.

The spicules have already been described. The bar-shaped forms in the polyps are sometimes almost fiddle-shaped.

Color: Rather dull grayish-brown throughout.

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Localities.—Station 5054; Omai Saki Light, S. 54° W., 29.5 miles; 282 fathoms (type). Station 5056; Ose Saki, N. 37° E., 5 miles; 258 fathoms.

Type-specimen.—Cat. No. 30099, U. S. N. M.

One specimen has several expanded polyps with bodies 3.5 mm. long. The spicules lie longitudinally in the body walls. Another specimen is attached to a shell by its end bulb, an anomalous condition for a pennatulid.

Genus STACHYPTILUM Kölliker.

Calyces present, free; zooids ventral.

STACHYPTILUM MACLEARI Kölliker.

Stachyptilum macleari KÖLLIKER, *Challenger* Reports, the Pennatulida, 1880, p. 12.

Length of colony 5.9 cm. Stem 3.5 cm., slender, with hardly evident end bulb and swelling; greatest diameter 2 mm. The calyces are in 12 rows on each side, 4 in each row. Rows oblique. A row of single rudimentary calyces extends quite a distance below the fully developed ones. The ventral calyces are the largest and the dorsal the smallest. The proximal and distal rows bear reduced numbers of calyces.

The calyces are contiguous, the larger ones being 2 mm. high and very obliquely placed, their walls covered with needle-like spicules longitudinally arranged, and borders armed with an indefinite number of irregular points composed of groups of spicules. Each tentacle bears a narrow band of small bar-like spicules on its dorsal surface. These spicules do not resemble those figured by Kölliker.

The zooids are numerous on all parts of the rachis not occupied by calyces or a narrow ventral median groove. Each zooid is surrounded by a radiating fence of needle-like spicules projecting in points. The zooids extend in a line alongside of the line of rudimentary polyps described above.

Color: The entire colony is white, in alcohol.

Locality.—Station 5071; Ose Saki, S. 53.5° W., 2.6 miles; 57 fathoms.

Type-locality.—Southeast of Ceram, west of New Guinea, 129 fathoms.

The specimen described above agrees with the original description except in the shape of the tentacular spicules.

Genus TRICHOPTILUM Kölliker.

Protoptilidæ with alternate calyces which have their margins armed with 8 spines, dorsal zooids, and numerous spicules in polyps and tentacles.

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TRICHOPTILUM SPINOSUM, new species.

Plate 7, figs. 3, 3*a*.

Colony 13.6 cm. long. Stem 6 cm. long, very slender, end bulb hardly evident and but 1 mm. in diameter. The calyces are in two very irregular rows on opposite sides of rachis and of various sizes. Small (or young?) polyps are usually found growing just above and inside of the larger ones. Some of the larger calyces measure 6 mm. to the ends of the spines, and have a marginal diameter of 2 mm. The general shape of the calyx is a cylinder gradually expanded toward the margin. The margin is armed with 8 prominent spines, some of which project as much as 2 mm., each point being composed of a number of needles gathered in a bundle. Other long needles form 8 longitudinal ridges on the calyx walls, resembling those of *Pennatula*. A number of smaller needles are found all over the calyx walls lying criss-cross, but tending to form a horizontal band just below the margin. An almost complete gradation can be found between the large calyces described and apparently rudimentary ones less than 1 mm. high.

Spicules are numerous throughout the rachis.

Zooids: Although these are present, I am unable to make out any definite arrangement, or to discriminate surely between them and the smallest of the rudimentary polyps, without dissecting the only specimen secured.

Color: The stalk is straw-yellow, deepening to an orange on the end bulb. The polyps are pallid, with the distal portions showing a tinge of red. The spicules are all colorless.

Locality.—Station 4959; Mizimoko Shima Light, N. 23° W., 28.5 miles; 405–578 fathoms.

Type-specimen.—Cat. No. 30100, U.S.N.M.

Genus HELICOPTILUM, new genus.

Colony in the form of a stiff spiral; calyces biserial, each with two very conspicuous spines or horns projecting from its outer margin.

HELICOPTILUM RIGIDUM, new species.

Plate 7, figs. 2, 2*a*; plate 18, fig. 5.

Colony (incomplete) growing in an open spiral. Axis very strong and stiff, quadrate in section. The largest specimen is 21 cm. in length, stem missing. The rachis is flattened dorso-ventrally, lesser diameter 2 mm., greater diameter (not including calyces), 2.7 mm. The calyces are in two rows, regularly alternate, their outer margins being very greatly prolonged into two conspicuous horns which often project as much as 2 mm. beyond the rest of the margin. The length of

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calyx, including spines, 3.5 mm; diameter at base, 1.9 mm; diameter between tips of spines, 2.3 mm. The inner sides of the calyces are cut away to the level of their bases, the polyp issuing ventrally between the enormous spines and facing directly upward as if issuing from the upper side of the calyx at its base. The calyx walls are filled with long orange-brown needles arranged vertically and parallel. Distance between calyx bases, 2.3 mm. There is a swelling beneath each calyx base.

There are no spicules in the polyps. The tentacles have large pinnules.

Zooids: There are usually two zooids just above and inside of the base of each calyx on the dorsal? side, although there is often but one; and one in a similar position on the ventral? side. There are no grooves on the rachis, and the dorsal and ventral sides differ only in the fact that the calyces are slightly inclined toward what I consider, with some doubt, as the dorsal side. There is no fence of spicules around the zooids.

Spicules: These are all needle-like forms, slender, smooth and sharp, averaging about 1 mm. long.

Color: Golden brown, the rachis lighter and the calyces darker. Polyps colorless.

Localities.—?Station 4793; Toperkov Island, Harbor of Nikolski, Bering Island, N. 58° E., 44 miles; 2,700 fathoms. Station 4975; Shio Misaki Light, N. 49° E., 7 miles; 712–545 fathoms (type). Station 4977; Shio Misaki Light, N. 65° E., 7 miles; 544 fathoms.

Type-specimen.—Cat. No. 30042, U.S.N.M.

A remarkable species, differing from all other pennatulids in habit of growth.

Order GORGONACEA.

Fixed colonial forms with an axis cylinder composed of calcareous or chitinous material.

Section HOLAXONIA.

Axis consisting of amorphous horny or calcareous material, or both, and not penetrated by longitudinal canals; except, in some cases, a central one.

Family CHRYSOGORGIDÆ Verrill.

Cœnenchyma thin; polyps large, distant, uniserial, without distinct calyces, and with neither operculum nor collaret; root calcareous; axis often with a brilliant metallic lustre.

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Genus LEPIDOGORGIA Verrill.

Lepidogorgia VERRILL, Amer. Journ. Sci. and Arts, ser. 5, vol. 28, 1884, p. 220.
Strophogorgia WRIGHT and STUDER, *Challenger* Reports, The Alcyonaria, 1889, p. 2.

Colony unbranched, slender; polyps growing on one side only.

LEPIDOGORGIA PETERSI (Wright and Studer).

Strophogorgia petersi WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 2.
Lepidogorgia petersi VERSLUYS, Chrysogorgiidæ of the *Siboga* Expedition, 1902, p. 7.

Specimens fragmentary, the largest being 45 cm. long with both extremities lacking.

The stem is 2 mm. in diameter; axis hard and stony, with a golden iridescence.

The polyps are uniserial, evenly spaced, about 4 mm. apart, 5 to 6 mm. in height and 2 mm. in diameter. The polyp walls contain long bar-like spicules, often somewhat flattened, sometimes bent, with rounded ends, sometimes as much as 3.5 mm. long. These are vertical in position. At the bases of the polyps are small groups of transverse spicules, often 3 or 4 to the group. The retracted tentacles are very irregularly disposed, being curled up and tucked together haphazard. Their dorsal surfaces are armed with bar-like spicules much shorter than those in the calyx walls. The tentacles are very unequal in size, the adcauline one being rudimentary, as pointed out by Versluys.

The stem is covered with a thin cœnenchyma the surface of which is filled with thin, flattened, scale-like spicules of various forms but not greatly branched, and with closely fitted edges. They are usually smaller than the spicules of the polyps.

Localities.—Station 4976; Shio Misaki Light, N. 59° E., 6.4 miles; 545–544 fathoms. Station 4977; Shio Misaki Light, N. 65° E., 7 miles; 544 fathoms. Station 5080; Omai Saki Light, N. 23.5° E., 28 miles; 505 fathoms.

General distribution.—Type-locality, Yeddo, Japan, 345 fathoms. East Indies, 621–1,301 meters (*Siboga* Expedition).

A specimen from station 5080 was 45 cm. long.

Genus CHRYSOGORGIA Verrill.

Colony branched; branches spirally arranged, giving off geniculate branchlets all from the same side of the branch; stem sympodial; tentacles never retractile.[1]

[1] This definition is condensed from that given by Doctor Versluys in his excellent work on the Chrysogorgiidæ of the *Siboga* Expedition, 1902, p. 18.

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CHRYSOGORGIA LATA Versluys.

Chrysogorgia lata VERSLUYS, Chrysogorgiidæ of the *Siboga* Expedition, 1902, p. 33.

Colony incomplete, 18 cm. high and with a spread of about 8 cm. The root is missing. The branch origins are in a left-handed spiral, 1/4; that is, the fourth will be immediately above the first, and the 4 origins will have made a single spiral around the stem. The average distance between branches is about 4 mm., and they give origin to branchlets up to the fourth order. There are about 3 polyps to each internode of the branches and branchlets. The polyps are small, about 1 mm. high to the base of the tentacles, and with bodies ovate or columnar according to the state of contraction and 0.4 mm. in diameter. Their walls are armed with 8 rather indefinite vertical rows of spindles which are bar-shaped with rounded ends. These rows are extended over the basal portions of the tentacles, usually in double rows. The tentacles are long, with smaller spicules usually irregular in distribution but sometimes transversely disposed on distal portions. There are small spicules also on the dorsal surfaces of the pinnules.

The branches have a thin coating of flattened, scale-like spicules.

Color: The stem is grayish, lightening distally. The branches are yellowish, with a golden gleam showing through from the iridescent axis. The polyps are white.

Localities.—Station 5091; Joga Shima Light, N. 15°, W., 4.2 miles; 197 fathoms. ? Station 5079; Omai Saki Light, N. 29° E., 24 miles; 475-505 fathoms. A mere fragment, not identified with certainty, was secured from this station.

General distribution.—The type was taken by the *Siboga* Expedition in Celebes Sea from a depth of 190 meters. Hawaiian Islands, 411–476 fathoms (Nutting).

CHRYSOGORGIA FLEXILIS (Wright and Studer).

Dasygorgia flexilis WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 10.

Chrysogorgia flexilis VERSLUYS, Chrysogorgiidæ of the *Siboga* Expedition, 1902, p. 43.

Several fragments, mostly destitute of polyps, were secured. The first nodes of the branches are much longer than in the original description, although this is not true of the smaller specimens secured. Branches in a right-handed spiral, 2/5, as described by Versluys from the type. Branchings to the fourth order are produced. There is usually but a single polyp to the internode, except in the distal ones, where there may be two or three. The polyps are expanded above and below, a typical one being 2 mm. in height.

The walls show 8 vertical rows of bar-like spicules with ends rounded and often expanded. There are a few verrucæ on the

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spicules. The spicules at the polyp bases are more crowded and irregular, the whole spiculation being more crowded than in type, almost covering the body walls. Usually, however, there are evident bare streaks between the rows of spicules, the spicules of a given row often imbricating. The rows are extended over the basal parts of the tentacles; but are smaller, irregularly placed, often transverse on the distal parts, some extending lengthwise over the pinnules.

The stem spicules are more flattened and scale-like, often fitted as in mosaic.

Color: The proximal part of the stem is dark brown, lightening on distal parts of branches and twigs to a horn yellow. The polyps are white.

Locality.—Station 4975; Shio Misaki Light, N. 49° E., 7 miles; 712–545 fathoms.

General distribution.—The type is from the coast of Chile, 120 fathoms. *Siboga* Expedition, East Indies, 822–918 meters. Hawaiian Islands, 280–323 fathoms (Nutting).

CHRYSOGORGIA AGASSIZII (Verrill).

Dasygorgia agassizii VERRILL, Bull. Mus. Comp. Zoöl., vol. 11, No. 1, 1883, p. 22.

Only a fragmentary specimen of this species was secured, but it shows the essential features as described by Verrill.

The base is a delicately branching mass of ivory-white rootlets which are purely calcareous. Branches 2/5, in the right-handed spiral. The basal internodes of the branches are much shorter than in the last species, being about 6 mm. long. Intermediate internodes about 5 mm. long, with a single polyp usually nearer the distal than the proximal end of the internode.

The polyps are less obliquely placed than described by Verrill, although in some cases they assume the erect posture figured by that writer. A typical polyp measures 2.2 mm. in height; body rather slender but expanding at each end, 1.2 mm. broad across tentacle bases and 1.5 mm. across the base of the polyp. The polyp walls are practically covered with vertical spicules that are not arranged in vertical bands of eight, although there is sometimes such a tendency in the distal parts. Double rows of thin, broad-ended spicules extend along the basal parts of the dorsal surfaces of the tentacles. Similar but smaller spicules lie transversely across the distal portions of the tentacles.

Spicules: These are bar-like with slightly expanded and rounded ends, and are distinctly tuberculate. The cœnenchyma is rather thick, white, and contains few spicules.

Color: The stem is golden yellow and the polyps and branches white.

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Locality.—Station 5080; Omai Saki Light, N. 23.5° E., 28 miles; 505 fathoms.

Type-locality.—Georges Bank, Atlantic coast of United States, 1,242 fathoms.

CHRYSOGORGIA DICHOTOMA Thomson and Henderson.

Chrysogorgia dichotoma THOMSON and HENDERSON, Alcyonaria of the Indian Ocean, I, Alcyonaria of the Deep Sea, 1906, p. 29.

The specimens are all incomplete. One is 6.8 cm. in height, with a diameter of 6.3 cm. The stem is very strong, wiry, and brittle. The branches are arranged in a spiral of 1/5, left-handed. The branches are closely approximated, a whorl occupying but 3 mm. of the stem. The longest branch is 4.2 cm. in length. The branches divide dichotomously, sometimes forking as much as five times. The polyps are lacking on the main stem, and on the proximal internodes of the branches. On one branch there are 3 polyps on the third internode, 7 on the fourth, 6 on the fifth, and 2 or 3 on the last. The fourth internode is the longest (12 mm.). Many of the polyps are stripped off, but it is not uncommon to find as many as 8 on an internode.

The individual polyps have the bodies greatly expanded with ova, thus being ovate in shape and enlarging again at tentacle bases; small, measuring less than 1 mm. to tentacle bases. The body spicules are bar-shaped, not scales, with somewhat enlarged ends, more slender than in *C. japonica.*[1] They are irregular in distribution, with a decided tendency to a vertical position, sometimes with an approach to 8 longitudinal bands. The dorsal surfaces of the tentacles are covered with sharply marked bands of similar spindles, there being two to three rows to the band. Similar but somewhat more slender spicules are embedded loosely in the cœnenchyma of the twigs and branches.

The zooids are numerous on the surfaces of the branches between the polyps.

Color: The axis is dark green, with a metallic luster in main stem. The branches are golden-brown proximally, lightening distally to a light green. The axis of the branches and twigs has a brilliant green luster except at ends of twigs. The polyps, in alcohol, are of a decided reddish-brown, thus differing from any others that I have seen in the genus.

Localities.—Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

The type-locality is in the Indian Ocean.

[1] According to Versluys, Chrysogorgiidæ of the *Siboga* Expedition, p. 70.

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The number of polyps to the internode and the color of the polyps are distinguishing marks of this species.

FAMILY PRIMNOIDÆ.

Colonial Gorgonacea with calcareous roots. Axis calcareous or horny, but never with alternating calcareous and horny joints. Calyces with opercula composed of 8 scales. Polyps often in whorls, their walls covered with scale-like spicules.

Subfamily CALYPTROPHORINÆ Versluys.

Calyx spicules reduced to two or three pairs of large scales.[1] Operculum conspicuous, turned toward branch when the polyp is retracted.

Genus CALYPTROPHORA Wright and Studer (emended by Versluys).

Calyx body with but two pairs of very large scale-like spicules usually entirely encircling the polyp.

CALYPTROPHORA IJIMAI Kinoshita.

Plate 16, figs. 2, 3.

Calyptrophora ijimai KINOSHITA, Ann. Zool. Japan, ser. 6, vol. 3, 1907, p. 234.
Arthogorgia membranacea KÜKENTHAL and GORZAWSKY, Japanische Gorgoniden, Teil I, 1908, p. 29.

Colony 10.5 cm. in height. The first branch arises 8 mm. above the base. The branches are pinnately arranged, alternate, undivided and erect, originating at an acute angle with the main stem and sometimes attaining a length of 7 cm. Diameter of the main stem 1.3 mm. The branches are attenuated and straight, ending in a mere thread.

The axis has a light green iridescence near its base, where it is apparently striated. There is no luster in the axis of stem and branches.

The polyps are in whorls of 4 or 5, all facing downward. The whorls are about 2 mm. apart. Calyces 2.2 mm. in height (measured parallel with the branch) and project about the same distance from the branch. Both the basal and distal pairs of spicules form incomplete rings, failing to meet on the stem side, and in both the individual spicules of a pair are cemented together. The distal pair bears four sharply pointed spines projecting nearly 1 mm. from the free fluted border. This pair is about 1.6 mm. long to base of spines.

The basal pair bears two very slender, often curved, spines projecting nearly 2 mm. beyond the border. This pair is almost 2 mm.

[1] In some cases there are a few additional scales of small size near the base of calyx.

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long. The base of the polyp is surrounded by a group of much smaller scales, forming a sort of collar in which the polyp is encircled.

The operculum is strongly developed, as is usual in this genus; but it is rather high, and the individual scales are slender triangles with their distal ends sharply pointed. Those on the abaxial side are longer than the others and overlap them considerably.

The branches are covered with a complete layer of comparatively small, flattened, irregular scales.

Color: The basal part of the stem and branches very pale yellow, calyces white.

Localities.—Station 5079; Omai Saki Light, N. 29° E., 24 miles; 475–505 fathoms. Station 5080; Omai Saki Light, N. 23.5° E., 28 miles; 505 fathoms. Station 5087; Joka Sima Light, S. 84.5° E., 14.8 miles; 614 fathoms.

General distribution.—Type-locality, Sagami Sea, 550 fathoms. Okinose Bank, 400 fathoms. Yodomi, Sagami Bay.

Superficially the calyces of this species greatly resemble those of *C. japonica;* but they all face downward, and both pairs of scales form an incomplete ring.

The specimens secured by the U. S. Fisheries steamer *Albatross* all show the curious membranaceous structure formed of strangely modified spicules which give refuge to a symbiotic annelid.

CALYPTROPHORA JAPONICA Gray.

Calyptrophora japonica GRAY, Proc. Zool. Soc. London, 1866, p. 25.

Colony incomplete, 13.1 cm. in height. The branchlets arise from the upper sides only of the branches, regularly spaced, 6 mm. apart and about 11 cm. long. The calyces are in whorls of 4 to 6 on the distal parts of branches and are about 2 mm. long. Both proximal and distal pairs of calyx spicules form a closed ring. The distal ring has four spines projecting downward, and the proximal ring has two spines projecting outward.

The polyps face the base of the stem or branch.

Operculum not very prominent, dome-shaped. Each flap is thin, triangular, with edges turned upward, the adaxial plate being much smaller than the others.

The branches are covered with flattened scales of irregular shape.

Color: The axis is almost black proximally, lightening distally. The colony in general is light brown.

Localities.—Station 4924; Nagada Saki, N. 8° E., 18 miles; 159 fathoms. Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms.

General distribution.—The type was from Japan. The *Challenger* found it near the Fiji Islands, 610 fathoms. The *Siboga* expedition secured it from the Malay Archipelago, 400–1,301 meters. Hawaiian

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Islands, 135–577 fathoms (Nutting). Japan, Satsuma, and Sagami Sea, 300–400 fathoms (Kinoshita).

The U. S. Fisheries steamer *Albatross* specimens closely resemble the one figured by Kinoshita.

CALYPTROPHORA KERBERTI Versluys.

Calyptrophora kerberti VERSLUYS, Primnoidæ of the *Siboga* Expedition, 1906, p. 105.

Several fragments of this species were secured from station 5093. The largest specimen is 9.5 cm. high, dichotomously branched. The polyps face downward, many of them broken off in the specimen, normally in whorls of four. Whorls about 2 mm. apart. The calyces are about 2 mm. high, and project 1.7 mm. from the branch. The basal scales do not form a complete ring on inner side, each with a spine-like process from its distal end and outer corner a little more than 1 mm. long. Buccal scales also forming an incomplete ring, often with no spines on distal ends, as figured by Versluys, but quite frequently showing two small spines. There is often a small ridge or keel at the superior junction of these two scales. The margin is not so straight as represented by Versluys, but is more or less sinuous and hood-shaped.

The scales in the branches are thin, often slender, and their ends are imbricating.

The axis is almost black proximally, lighter distally. The branches are gray and the calyces are almost white.

Locality.—Station 5093; Joga Shima Light, N. 8° W., 5 miles; 302 fathoms.

The type-locality is Japan (Hilgendorf).

Genus STACHYODES Wright and Studer.

Calyx consisting of three pairs of large scale-like spicules, the basal pair usually not completely encircling the polyp.

STACHYODES MEGALEPIS Kinoshita.

Stachyodes megalepis KINOSHITA, Primnoidæ von Japan, 1908, p. 47.

Several small specimens secured by the U. S. Fisheries steamer *Albatross* agree quite closely with the original descriptions and figures of this species.

Colony incomplete, 12.3 cm. high, flabellate in form. The main stem, or branch, gives off two main branches which divide dichotomously into four. The axis has a greenish-gold luster. On the basal parts the calyces are in whorls of 7 or 8; on the distal parts they are in whorls of 5, closely approximated. Calyces about 3 mm. high. The basal scales are the largest and the middle pair the smallest, each pair with its margin curved slightly backward, and each has the appearance of having a marginal border of different texture from the

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rest of the scale. The pairs all fail to make a complete ring, being lacking on the adaxial side.

The operculum is composed of very thin scales more or less fluted or frilled on the edges, so that the borders are turned upward. The adaxial scales are much smaller and have much less pronounced frills than the others.

The branches are covered with small thin fluted scales. In places these are enormously enlarged by a parasitic annelid, forming an arcade along the branch, which furnished a character for Allman's genus *Calypterinus*.[1]

Color: The colony is dull, yellowish-brown.

Localities.—Station 4918; Gwaja Shima, S. 38° E., 34 miles; 361 fathoms. Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms. Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

General distribution.—The type was secured from Gokeba, southwest from the Province of Awa, Japan. Another fragment was from the Sagami Sea.

Genus CALIGORGIA Gray (emended by Versluys).

Colony flabellate, pinnate or dichotomous, without secondary branchings. Calyces in whorls, club-shaped, appressed to the branches and with their adaxial walls incomplete. Circumopercular scales lacking.

CALIGORGIA FLABELLUM (Kölliker).

Primnoa flabellum Kölliker, Icones Histologicæ, vol. 2, 1865, p. 135.
Calligorgia flabellum Studer, Monatsber. Akad. Wiss. Berlin, 1878, p. 646.

Colony 20 cm. high, strictly flabellate, breaking up near its base into four large branches which are scarcely flattened. Secondary branches rare. Branchlets regularly alternate, averaging about 6 mm. apart, all in one plane.

The calyces are clavate, much curved, nearly facing the branch. Ordinarily they are in whorls of four, but increase proximally until there are as many as 18 on the bases of the larger branches. The individual calyces are 1.5 mm. in height, and nearly uniform in diameter. There are usually about 8 whorls to the cm. There are 7 scales in each of the abaxial rows and 4 or 5 in the outer lateral rows. Adaxial scales 2. The sculpturing on the distal scales is not so pronounced as figured by Versluys and Kinoshita; but the calyces are practically identical with those figured by Wright and Studer.

The operculum is high, conical, composed of slender triangular flaps, the adaxial ones being shorter than the others. All of the spicules are plainly granulated.

[1] *Challenger* Reports, the Alcyonaria, 1889, p. 83.

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Color: The colony is a light buffy-brown.

Locality.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

General distribution.—Pacific and Indian Oceans; Japan. Down to 1,250 meters.

CALIGORGIA VENTILABRUM Studer.

Caligorgia ventilabrum STUDER, Monatsber. Akad. Wiss. Berlin, 1878, p. 647.

A number of very large fragments of one or more specimens of this species were collected by the U. S. Fisheries steamer *Albatross*. Station label lost.

One fragment is 54 cm. long. Diameter at base 6.5 mm. The main branch is somewhat flattened. The branching is typically dichotomous, except that the main branch gives off a number of laterals, mainly from one side. The terminal twigs are very long, as much as 20 cm. in some cases. All of the branches are erect, nearly parallel, the whole forming a flabellate structure. The average diameter of the secondary branches is 4 mm.

The calyces are in regular whorls of 4 on distal ends of branchlets and 12 on large branches. On the longest branches they are irregular, often wanting. There are but 4 or 5 whorls of calyces to the cm. The individual calyces are large, 2 mm. long, with 9 or 10 scales to the adaxial and outer lateral rows. Some of the latter have the peculiar lateral processes figured by Versluys in *Caligorgia affinis*.[1] Otherwise the specimens agree better with *C. ventilabrum*.

The inner laterals and adaxials are greatly reduced in number, being apparently represented by their distal elements alone; although these appear to be rudimentary scales representing the basal ones.

The operculum is not conspicuous, composed of smooth triangular scales, the adaxial being the smallest and the abaxial the largest and overlapping slightly the others.

Color: The axis is almost black proximally, lightening distally. The general color of the colony is very light tan-brown.

Locality.—Label lost.

Type-locality.—North of New Zealand, 90 fathoms.

A very fine species. The specimens just described are the largest of the genus.

CALIGORGIA ASPERA Kinoshita.

Caligorgia aspera KINOSHITA, Primnoidæ von Japan, 1908, p. 39.

Colony in fragments, the longest piece being 12.2 cm. long and with a spread of 6.2 cm. There are branches on two sides of the main branch, forming a flabellate structure; side branches dividing dichotomously sometimes to branchings of the sixth order and attaining a length of 5.9 cm. in some cases.

[1] Primnoidæ of the *Siboga* Expedition, p. 76.

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The calyces are ordinarily in whorls of 3, the 3 being on front and sides of the branch, usually leaving the back free from polyps. There are 8 to 10 whorls to the cm. On thicker parts of branches whorls of 4, rarely 5, are seen. They are seldom in pairs, except at the very ends of the twigs. The individual calyces are strongly curved, their distal ends turned toward the branch. They are 1.5 mm. long, measuring with dividers across the curve, and about 1 mm. in opercular diameter. The scales are well marked, apparently imbricating and with their surfaces covered with pointed granules. The calyx margin is quite even, being squarely cut off all around, although the abaxial scales may form slight rounded lobes. The abaxial rows contain usually 6, sometimes 5, scales; outer lateral with one large distal scale and sometimes another proximal one. Occasionally one or two small inner laterals can be seen, but they are not constant.

There are no adaxials.

The operculum is strong, dome-shaped, with scales thick, heavily granulated, with large basal lateral lobes and narrowing distally to a comparatively slender point. The basal edges of the abaxials overlap the outer laterals, and these overlap the inner laterals. The adaxial opercular scales are shorter than the others, but are not overlapped by their points.

The scales on the twig surfaces are rounded, flat, rather large and granulated like those of the calyces.

Color: The axis is light green with a golden luster. The general color of the calyces and branches is tan-brown.

Localities.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms. ? Station 5070; Ose Saki, S. 8° W., 1.8 miles; 108 fathoms.

General distribution.—Type-locality, west coast of Satsuma, Japan.

Subfamily THOUARELLINÆ Versluys.

Colony usually pinnate and with secondary short branches. Calyces arranged in various ways, seldom appressed to the branch. Longitudinal rows of calyx scales evident, not greatly reduced on the adaxial side.

Genus PLUMARELLA Gray (modified by Kinoshita).

Colony pinnate, with short twigs, but never with secondary short twigs. Calyces never in well-defined whorls or in pairs, with openings directed distally. Polyp scales in 8 longitudinal rows, without circumopercular scales. Operculum evident.

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PLUMARELLA SPINOSA Kinoshita (not Kükenthal).

Plumarella spinosa KINOSHITA, Primnoidæ von Japan, 1908, p. 11.

Colony 35 cm. long, and with a spread of 25 cm.; strictly flabellate, the main stem giving off irregularly alternate main branches which themselves give off a few irregularly disposed secondary branches. Ultimate branches irregularly alternate, forming a plane surface, about 10 or 12 to 5 cm. The calyces are in 2 rows on distal ends of twigs only, otherwise in 3 to 5 irregular rows, but not in whorls; club-shaped, 1.5 cm. high including operculum, and 1 mm. broad at distal end. The margin is armed with usually 4, sometimes 5 or 6, not very long points. The scales are in 8 rows, 6 to the row except in the adaxials, which have 3. The scales regularly imbricating, each with a rounded distal edge.

The operculum is only moderately elevated, composed of flat triangular flaps, the ends of the adaxial ones being tucked under the ends of the others.

Color: Axis dark brown, lightening distally. General color light buffy-brown.

Localities.—Station 4769; lat. 54° 30′ 40″ N.; long. 179° 14′ E.; 244–237 fathoms. Station 4781; lat. 52° 14′ 30″ N.; long. 174° 13′ E.; 482 fathoms. Station 4787; north point Copper Island, N. 79° E., 8.5 miles; 54–57 fathoms.

Distribution.—The type was from Mochiyama, Japan, 180 fathoms, and other specimens from Doketsuba, Japan, 130 fathoms.

The calyces resemble the type quite exactly. The specimen described above is coarser than the type and usually has 4 rows of calyces instead of 2, although there are 2 on the distal ends of the twigs.

PLUMARELLA FLABELLATA Versluys.

Plumarella flabellata VERSLUYS, Primnoidæ of the *Siboga* Expedition, 1906, p. 16.

A fragmentary specimen is referred to this species. It consists of a single branch 18 cm. long, slightly flattened (the cross section is 2 mm. by 2.5 mm.), forking distally.

The ultimate branches are alternate, 10 or 11 to 5 cm. in length of branch. The calyces are irregularly distributed on all sides of the branches, sometimes in pairs but never in regular whorls, thickly crowded, 25 to 30 in 1 cm. They are small, stout, club-shaped, usually less than 1 mm. in height. The scales are heavy, coarsely granulated, the edges with irregular lobes and points or irregularly ctenate. Some of the marginal scales bear short spines, but they are often as represented by Versluys. Some of these points are triangular and others are spatulate. The adaxials are 3 or 4 in number; the abaxials 6.

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The operculum is strongly developed, conical, each flap consisting of a triangular scale beset with sharp points, the inner scales not much smaller than the outer.

Locality.—Station 4784; East Cape, Attu Island, S. 18° W., 4 miles; 135 fathoms.

General distribution.—The type-locality is Japan.

The specimen differs from the type in the superficial granulation of the scales and the presence of spines on many of the marginal scales, but it agrees well in other details.

PLUMARELLA CARINATA Kinoshita.

Plumarella carinata KINOSHITA, Primnoidæ von Japan, 1908, p. 17.

Several specimens, mostly fragmentary, evidently belong to this very well-marked species.

The calyx scales differ from others of the genus, except *P. costata* Kükenthal, by having well marked median carinæ. These keels, however, are not easily seen when the specimen is immersed in fluid; but become quite evident when the specimen is partly dried.

Another characteristic pointed out by Kinoshita is the comparatively small size of the abaxial scales, these being actually smaller than the laterals, a character that is very rare in this family. Another peculiar feature is the abrupt turning upward of the calyx, which has its basal part projecting outward and its distal part turned upward, thus resembling a tobacco pipe in form. This results in the adcauline side of the calyces being entirely free from the branches.

Localities.—Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106–95 fathoms. Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 4895; Ose Saki Light, N. 42° E., 4.7 miles; 95 fathoms.

General distribution.—The type-locality is Kozu Island, south of the Province of Izu, Japan.

This species very closely resembles *Plumarella cristata* Kükenthal,[1] with which it may be identical, although this is denied by Kinoshita.

PLUMARELLA SPICATA, new species.

Plate 8, figs. 2, 2*a*; plate 18, fig. 6.

A number of fragments from Station 4780 resemble *Plumarella longispina* Kinoshita,[2] but seem to be fairly distinct.

Colony very loose and straggling in habit, flabellate, irregularly branching. The terminal twigs are about 6 to 8 in 5 cm. in length of branch. The calyces are irregularly distributed on two sides of the branch, and are only accidentally in pairs. They often project at a

[1] Kükenthal und Gorzawsky, Japanische Gorgoniden, Teil I, 1908, p. 16.
[2] Primnoidæ von Japan, 1908, p. 14.

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right angle from the branch, but are usually inclined outward and upward. Calyces about 1 mm. high to base of spines, club-shaped, but not so much bent as is usual in this genus, although there is considerable variation in this feature.

The marginal scales have long sharp spines, sometimes 1 mm. in length. There are 6 scales to each abaxial and outer lateral rows, and 5 scales to each inner lateral and adaxial row. All the scales have minutely ctenate edges and minutely granulated surfaces.

The operculum is very high, reaching almost to the ends of the spines, each scale being an acute-angled triangle, and the adaxial ones being scarcely shorter than the others.

The spicules of the stem and branches form an irregular mosaic, and do not greatly overlap.

Color: The axis has a bright golden metallic luster, except on the proximal parts of the large branches, where it is greenish-brown. The general color of the colony is very light buffy-brown.

Locality.—Station 4780; lat. 52° 01′ N.; long. 174° 39′ E.; 1,046 fathoms (type). ?Station 4771; lat. 54° 30′ N.; long. 179° 17′ E.; 426 fathoms. Specimens from the latter station are so fragmentary and broken up that they are identified with doubt.

Type-specimen.—Cat. No. 30050, U.S.N.M

This species has a more loose and straggling habit than any other of the genus that I have seen.

PLUMARELLA ADHÆRANS, new species.

Plate 8, figs. 1, 1*a*; plate 19, fig. 1.

Colony (incomplete) 19 cm. long. The main stem, or branch, is flattened, being 2 by 3 mm. in section, and is forked near its middle. There are few secondary branches.

The terminal twigs are in the same plane, alternate, and are usually 6 or 7 to each 2 cm. of length of stem or branch. The calyces are in two rows, but not in pairs, usually alternate, and there are usually 11 or 12 to each cm. of branch.

The individual calyces are short, stout, almost conical, with the adaxial sides closely appressed to the branch almost to the margin, a little over 1 mm. in height and 0.7 mm. broad at margin. Abaxial and outer lateral marginal scales armed with sharp spines; otherwise the margin is quite even and clean cut all around. Abaxial and lateral scales 5 in a row; adaxial rows with 2 wide short scales. All of the scales have even margins, not ctenate, but often with a central lobe and comparatively smooth surfaces.

The operculum is a low cone or dome, well developed, each flap being a rather broad flat triangle, the adaxial ones being but slightly smaller than the others and with their points scarcely overlapped by

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the latter. The scales on the branches are rather large plates, the twigs themselves being thicker than usual. The scales often have their edges imbricating.

Color: The axis is a dull yellowish-olive, branches and calyces light buffy-brown.

Localities.—Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 4895; Ose Saki Light, N. 42° E., 4.7 miles; 95 fathoms. Station 5070; Ose Saki, S. 8° W., 1.8 miles; 108 fathoms (type).

Type-specimen.—Cat. No. 29799, U.S.N.M.

This species is distinguished from others of the genus by the size and form of the calyces.

Genus THOUARELLA Gray (modified).

Colony usually flabellate and pinnate; ultimate twigs springing from all sides of the branches, very numerous; calyces either isolated or in whorls, club-shaped, seldom adherent to the branches; calycular scales in 8 rows, at least distally.[1]

THOUARELLA HILGENDORFI (Studer).

Plumarella hilgendorfi STUDER, Monatsber. Akad. Wiss. Berlin, 1878, p. 648.

Colony (incomplete) 14 cm. high and with a spread of 4.6 cm. A single branch only is present in the specimen described, which gives off numerous twigs from all sides so closely set that a spiral arrangement can not be made out, and attains a length of 3.9 cm. Those from the front of the colony are shorter, giving the whole specimen a flabellate appearance. The calyces are in whorls or short spirals of 3, the summit of one not usually reaching the base of the one next above. There are about 18 whorls to 2 cm. in length of branches.

The individual calyces are rather slender cones, but slightly bent toward the axis. Some are almost straight symmetrical cones, 1.3 mm. high to margin. Each circumopercular scale has a median keel that is produced into a prominent point which is more pronounced than in Versluys's description. The eight rows of scales overlap laterally, so as to be obscured on proximal portions. There are apparently 6 scales in the abaxial rows and 5 adaxials. The operculum is concealed by the circumopercular scales. It is composed of triangular flaps, the adaxial somewhat smaller than the others, and with their ends overlapped by the ends of the others.

The stem scales are thin and more or less imbricating.

Color: The colony is light yellowish-brown.

Localities.—Station ?4771; lat. 54° 30′ N.; long. 179° 17′ E.; 426 fathoms (fragment). Station 4895; Ose Saki Light, N. 42° E., 4.7

[1] Some of the points in this definition are condensed from that given by Kinoshita, Primnoidæ von Japan, 1908, p. 21.

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miles; 95 fathoms. Station 4934; Sata Misaki Light, N. 77.5° E., 7 miles; 152–103 fathoms (large colony, more decidedly brown than the others). Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms. Station 5070; Ose Saki, S. 8° W., 1.8 miles; 108 fathoms (much like the next, but the polyps are smaller; spiculation the same). Station 5093; Joga Shima Light, N. 8° W., 5 miles; 302 fathoms (brighter in color; spines very slender).

General distribution.—The type was from Yeddo Bay, Japan. Other localities are Kei Islands, East Indies, 204–540 meters; Sagami Bay, Japan, 100–400 fathoms; Suruga Bay, Japan, 1,200 fathoms; Indian Ocean, 371 meters.

These specimens differ from Versluys's figures [1] in slenderness of calyces and prominence of spines. The latter is also noted by Kinoshita in his description of this species.

This is a very abundant and variable species, but the intergradations indicate that all of the specimens noted belong to the same form.

THOUARELLA RECTA, new species.

Plate 7, figs. 1, 1*a*; plate 19, fig. 2.

Colony incomplete, consisting of a stem 4.7 cm. long, on the distal part of which the branches are arranged in spirals of three, while they are arranged irregularly on the proximal portion. The branches are usually simple, often fork, and occasionally give off branchlets. The longest ultimate branchlet is 2.4 cm. long. Twigs very slender, those of a given row being about 2 mm. apart. Polyps quite distant, very irregularly distributed, mostly lateral, but showing a tendency to an arrangement in long spirals of about 5 to a turn, each spiral occupying about 4 mm. of the length of the twig.

The calyces stand straight out from the branch, as in *Stenella*, and are almost radially symmetrical, although the mouth is often slightly inclined toward the distal end of the colony. The height of a typical calyx is about 1.4 mm., although they vary greatly in size, as if calyces in various stages of growth were irregularly distributed along the branches. The circumopercular scales are all armed with long slender spines. There are six scales to each longitudinal row in the calyx walls, all provided with finely ctenate edges.

The operculum is rather low and nearly concealed by the circumopercular spines. The opercular scales are triangular, and there is little if any distinction between the adaxial and the others. The large edge of these scales is ctenate.

The scales of the stem and branch surfaces are rounded or irregular, with some imbrication of their edges, and form two layers.

[1] Primnoidæ of the *Siboga* Expedition, 1906, p. 27, fig. 17.

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Color: The axis is a golden brown on the proximal parts of the fragment, lightening distally. The calyces and cœnenchyma of the branches are very light, almost white.

Locality.—Station 5079; Omai Saki Light, N. 29° E., 24 miles; 475–505 fathoms.

Type-specimen.—Cat. No. 30040, U. S. N. M.

This species resembles *Thouarella laxa* Versluys,[1] but it differs consistently in the arrangement of the calyces, which are never, or only accidentally, in pairs, as in the latter species.

THOUARELLA TYPICA Kinoshita.

Thouarella typica KINOSHITA, Ann. Zool. Japan, ser. 6, vol. 3, 1907, p. 23.

The specimen secured by the U. S. Fisheries steamer *Albatross* is broken, but two specimens that seem to match measured together 32 cm., with a spread of 5.6 cm. The stem is superficially very dark, almost black. Greatest diameter 4.3 mm. The stem gives off two branches. The twigs are very densely aggregated, forming a thick flattened brush, and arise from all sides of the stem, the longest being about 3.2 cm. in length.

The calyces are in very short verticils of 2 or 3, there being 10 to 12 verticils to 1 cm. in length of twig. The individual calyces are rather slender clubs, often almost conical, standing with their inner sides almost touching the branch and their mouths opening upward. They are little over 1 mm. in height with an opercular diameter of about 0.7 mm. Calyx scales in very irregular rows, with plain rounded distal edges. The abaxial and lateral rows have 6 scales to the row, and the adaxials 4. The circumopercular scales have each a strong keel projecting from the inner side of its distal edge, and this keel ends in a rather blunt flattened point.

The operculum is quite low and is concealed by the circumopercular scales. Flaps rather slender triangles, those of the adaxial side being shorter than the others and having their edges tucked under them.

The scales of the cœnenchyma are rounded and often imbricated like fish scales.

Color: The axis is very dark, almost black, in the stem and twigs almost to their distal ends. The general color of the colony is a grayish-brown.

Localities.—Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

The type-locality is west coast of Satsuma, Japan.

[1] Primnoidæ of the *Siboga* Expedition, 1906, p. 30.

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THOUARELLA STRIATA Kükenthal.

Plate 10, figs. 2, 2*a*.

Thouarella striata KÜKENTHAL, Gorgoniden des Deutschen Tiefsee Expedition, 1907, p. 204.

Colony flabellate in form, 32 cm. in height and with a spread of 25 cm. The main stem is 1 cm. thick near base, and flattened, as are the main branches, and after sending off a few irregular small branches on one side the stem (11.5 cm. from its base) divides into two large branches. These divide irregularly into several branchlets, and these again sometimes divide until branchings of the fifth order are reached. The ultimate twigs are pinnately arranged, close set, often forking, and forming a flabellate structure.

The calyces are in irregular whorls of 5 or 6 to even 10, closely set, nowhere distinct; but the calyces are arranged as in the genus *Eunicea*, for instance, without distinction of well-defined whorls even on the ultimate twigs. The calyces distinctly overlap. In 1 cm. there are about 10 calyces in as near a longitudinal series as can be found. The individual calyces are not so decidedly bent toward the branch as is usual in this genus, but the adaxial rows of scales are reduced to 2 or 3. The calyces are about 1.5 mm. high, club-shaped, with a greatest diameter of about 1 mm. The polyps face upward, not inward. The scales all have ctenate edges, the upper ones have radiating ribs and the basal ones are without evident ribs. All scales have distinctly granulated or verrucose surfaces, and the distal ones have radiating ridges, as stated above.

All but the adaxial scales have usually 6 scales each, and the distal scales have each a median rather blunt projecting point and a series of smaller lateral points on either side.

The operculum is low, scarcely projecting above the marginal points, the individual flaps being rather thick triangular scales with a roughly granulated surface. The abaxial ones project over the points of the adaxial.

The cœnenchyma of the branches is covered with a mosaic of irregular scales.

Locality.—Station 4778, Semisopochnoi Island, right tangent S. 45° W., left tangent S. 12° W., about 12 miles; 43–33 fathoms.

Type-locality.—East side of Bouvet Island, South Sea, 457 meters.

The lateral branches and terminal twigs of the specimen described are coarser than is usual in this genus, reminding one of *Caligorgia*.

THOUARELLA ALTERNATA, new species.

Plate 9, figs. 1, 1*a*; plate 19, fig. 3.

Colony 16 cm. high, and with a spread of 5.6 cm. The ultimate branches are borne on three sides of the main stem and reach a length of 3.2 cm, and are thickly emplanted, the distance between adjacent

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ones in a given row being but 3 mm. The calyces are distant and usually regularly alternate, averaging about 2 mm. apart. They are considerably curved, with large distal and slender proximal parts, as if borne on pedicels, they are almost never in pairs and are usually regularly alternate with the mouths opening upward. A typical calyx is 1.5 mm. high to margin. The scales are all thin and delicate, the circumopercular ones with long sharp spines, those on the adcauline scales being very short or absent. The edges of the calyx scales are minutely ctenate. The circumopercular spines are 1 mm. long and very slender. Owing to the delicacy of the scales it is hard to determine the number in the several rows, but they are more numerous than usual, probably 8 or 9 in the abaxial rows and 6 or 7 in the laterals, and apparently 4 in the adaxials.

The operculum is low, conical, composed of such exceedingly delicate scales that they are seen with difficulty by reflected light. They are flat, triangular. The tentacles of the polyps are partly protruded.

The scales are the most delicate of any that I have seen in this family, but are of the common type found in *Thouarella*, *Caligorgia*, etc.

Color: The axis of the stem is golden-green. The general color of the colony is almost white.

Localities.—Station 5079; Omai Saki Light, N. 29° E., 24 miles; 475–505 fathoms. Station 5080; Omai Saki Light, N. 23.5° E., 28 miles; 505 fathoms (type).

Type-specimen.—Cat. No. 30097, U.S.N.M.

The alternate disposition of the calyces and the number and extreme delicacy of the body scales are characteristic features of this species.

Genus PRIMNODENDRON, new genus.

Colony growing in dense flabellate tufts, each branch giving off a series of branchlets from all sides and each branchlet dividing into a dense tuft of terminal twigs which together form a closely compacted mass of twig terminations, most of which are directed anteriorly, forming a peculiar matted surface. Calyces in indistinct rows, being neither in pairs nor in whorls. Individual calyces much like those of *Plumarella*.

Primnodendron differs from *Plumarella* in bearing secondary branchings from the terminal twigs, and from *Thouarella* in having the calyces arranged neither in pairs nor in whorls.

Type of the genus.—Primnodendron superbum, new species.

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PRIMNODENDRON SUPERBUM, new species.

Plate 9, figs. 2, 2a; plate 19, fig. 4.

Colony 31 cm. high, flabellate in general form. The main stem immediately divides into three branches, the central branch forming the main part of the colony. This gives off several lateral branches which, in turn, give off innumerable branchlets. These latter divide so as to form a small rigid tuft of ultimate twigs which together form a compact flattened mass so thick as to look like certain lobate heads of coral, as, for example, *Pocillopora* or certain flat forms.

Each main branch gives off very numerous branches from all sides, but those from the front and back are shorter than those from the sides and terminate approximately on the same planes in front and back of the colony. All are very closely compacted so that the spaces between the twig terminations are hardly greater than those occupied by the twig ends themselves.

The calyces are rather thickly emplanted on all sides of the twigs, neither in regular whorls nor in regular longitudinal rows, but sometimes approaching the latter. In general there are from 4 to 6 such irregular rows of calyces. The calyces are rather slender curved clubs about 2 mm. long and 1 mm. broad at distal ends. Their openings face directly upward and their margins are ornamented by sharp points from the abaxial and lateral marginal scales. The adaxial marginal scales have very minute points, or none. Two or three horizontal rows of scales below the marginals have similar but smaller points. The eight vertical rows of scales are very plainly marked, and each scale overlaps considerably the base of the one above and ends in a somewhat flaring thin margin with a central point. These points decrease regularly in size from the margin to base of calyx, ending before the latter is reached. There are 6 or 7 scales in each abaxial, abaxial lateral and adaxial lateral row, and 3 or 4 to the adaxials.

The operculum is well developed, each scale bearing a lengthened point much like those around the calyx margin. The adaxial opercular scales are much smaller than the others, and bear no points.

The scales in the cœnenchyma are smaller than those in the calyx walls, and are irregular in shape, forming a mosaic.

Color: The colony is a light yellowish-brown and the axis is black proximally, and lightens distally.

Locality.—Station 4778; Semisopochnoi Island, right tangent S. 45° W., left tangent S. 12° W., about 12 miles; 43–33 fathoms.

A second specimen from the same station is larger than the one described, being 45 cm. high.

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This is the handsomest primnoid in the collection, and shows such marked differences from all other known forms that it forms the type of a very well marked new genus.

Type-specimen.—Cat. No. 30691, U.S.N.M.

Family MURICEIDÆ.[1]

Axis horny, unjointed, not surrounded by a regular series of water-vascular canals. Calyces various, but never with apertures turned toward branch; a pseudo-operculum present, composed of 8 parts each of which is attached to a tentacle base and is usually composed of 3 spicules forming an acute-angled triangle; collaret present, composed of circular rows of spicules; cœnenchyma usually bristling with spicules which are of exceedingly varied form.

Genus ACANTHOGORGIA Gray (emended by Verrill and, later, by Nutting.)

Calyces tubular, their walls with spicules arranged *en chevron;* margins with a crown of points composed of spicules with a distal thorny point and a proximal mass of tubercles or branched processes, the two parts being separated by a bend in the main shaft of the spicule.

ACANTHOGORGIA STRIATA Nutting.

Acanthogorgia striata NUTTING, Gorgonacea of the *Siboga* Expedition, III, The Muriceidæ, 1910, p. 20.

But a fragment of a branch 3.9 cm. long was secured by the U. S. Fisheries steamer *Albatross.*

The calyces are rather thickly emplanted on all sides of the branch, in no apparent order. The individual calyces are tubular, with a constriction at the distal end, 2.7 mm. high and 1.3 mm. in diameter. The margin is crowned with an indefinite number of sharp thorny points, usually in small bundles of 3 or 4, projecting 1 mm. above the margin. The calyx walls are distinctly striated longitudinally on account of the darker brown mesenteries showing through, and are furnished with 8 longitudinal bands of spicules very distinctly arranged *en chevron.* Inside of the crown of points are a number of similar points some of which lie along the dorsal surfaces of the infolded tentacles.

Spicules: The crown spicules are all of the regular acanthogorgian type, about 1 mm. long, the distal portion smooth and the proximal part not very abruptly bent and tuberculated. The other spicules are small warty spindles with an occasional tuberculate form.

Color: The colony is light-brown, and the calyces are longitudinally striated with 8 darker bands.

[1] The definitions for the Muriceidæ and the genera included in it in the present work are condensed from the definitions given in the author's Monograph on the Muriceidæ of the *Siboga* Expedition, 1910.

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Locality.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

Distribution.—The type-locality is North Celebes, 80 meters; also found by the *Siboga* Expedition in Banda Sea, 304 meters.

ACANTHOGORGIA FUSCA, new species.

Plate 10, figs. 1, 1*a*; plate 19, fig. 5.

Colony flabellate in form, very dark in color, 12 cm. in height, and with a spread of 13 cm. The stem is unbranched for 6.1 cm., above which two large branches are given off from each side and a stub on one side. The main branches are closely approximated, and each sends off several irregularly disposed lateral branches which sometimes fork, but usually remain simple. The calyces are very thickly distributed on all sides in indistinct whorls or spirals of 4 or 5, the distance between calyces being usually considerably less than 1 mm.

The individual calyces are tubular with an abrupt constriction just below the tentacle bases, 1.8 to 2 mm. in height and with a greatest diameter of 1.2 mm. There is a crown of conspicuous points projecting upward and outward from the margin, each point being formed by a single long sharp spicule projecting 1 mm. beyond the margin. The calyx walls are filled with long spindles arranged *en chevron* in 8 rows, their points projecting upward and outward from the walls. The distal parts of the walls are much lighter in color than the rest and seem to have smaller spicules, excepting those of the margin. Inside the crown are a number of similar thorny spindles bending over the tentacle bases and almost completely concealing the latter when viewed from above.

The spicules are all spindles. Those of the crown are of the regular acanthogorgian type, 1.7 mm. long, with a long, slender, smooth pointed distal part, and a much shorter, densely tuberculate (but not branched) proximal part which is bent at an angle with the distal part and immersed in the calyx wall. The other spicules are bent or curved, rather slender spindles with surfaces covered with not very closely crowded pointed tubercles.

Color: The stem is dark brown, calyces umber-brown lightening on distal parts; crown and tentacular portions appearing white on account of the dense tuft of colorless spicules.

Locality.—Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms.

Type-specimen.—Cat. No. 30051, U.S.N.M.

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ACANTHOGORGIA PARADOXA, new species.

Plate 11, figs. 2, 2a; plate 20, fig. 1.

Colony (fragmentary) irregular, 5.5 cm. in height and with a spread of 2.8 cm. The main stem is but 9 mm. long. Immediately above the base it gives off 2 short stubs of branches, 1.8 cm. above this a forked lateral branch is produced, and about 6 mm. above this latter is a branch bearing 2 laterals which are on opposite sides. The calyces are thickly emplanted on all sides of the stem and branches, there sometimes being irregular whorls of about 5, although no regular arrangement is discernible.

The individual calyces are strictly columnar in shape and attain a height of 3 mm. and a diameter of 1.3 mm. The margin is surrounded by a crown of spicules consisting of an irregular number of sharp points projecting upward and outward. Within the crown are a number of other similar points bending over the tentacle bases. The spiculation of the calyx walls is unique in the genus *Acanthogorgia*. Their surface is covered by a layer of vertical and parallel spindles many of which extend straight from base to crown, their proximal ends even bending and extending for some distance over the cœnenchyma surrounding the calyces. Some of these spindles are nearly 3 mm. long. Inside of these and occasionally showing between them are a number of much smaller spindles which, at least near the distal ends of the calyces, show the *en chevron* arrangement characteristic of the genus.

Spicules: The crown spicules are of the regular acanthogorgian type, attaining a length of nearly 3 mm. The proximal immersed portion is proportionally larger than in the last species and densely tuberculate, and the distal part has a few distant points and is not so smooth as in the last. The spicules of the outer layer of the calyces and branches are coarse, short, often bent, densely tuberculate spindles sometimes 3 mm. long. Besides these there are the much smaller spindles of the inner layer.

Color: The whole colony is a rather light, clear tan-brown.

Localities.—Station 4890; Ose Saki Light, N. 2° W., 10 miles; 135 fathoms (type). Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 5070; Ose Saki, S. 8° W., 1.8 miles; 108 fathoms (fragment).

Type-specimen.—Cat. No. 30035, U.S.N.M.

This form may need a new genus to include it; but as it substantially agrees with the definition given for *Acanthogorgia*, it is thought best to place it here.

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Genus ANTHOMURICEA Wright and Studer.

Calyces cylindrical, without a crown of points, walls with spindles arranged *en chevron*. Operculum conspicuous, 8-rayed, the basal part with small spindles *en chevron*.

Spicules without "Stachelplatten."

ANTHOMURICEA ABERRANS, new species.

Plate 13, figs. 3, 3*a*; plate 20, fig. 2.

Colony flabellate, irregularly branching, 9.7 cm. high and with a spread of 8.5 cm. This stem is 3.4 mm. in diameter, slightly compressed laterally. After sending off four minute lateral branches it forks about 1.2 cm. from its base, into two large branches, both of which send off several irregularly disposed lateral branches which subdivide in the same manner until in one case branching of the fifth order is produced. The ultimate branches are scraggly, something like those of an oak tree. The calyces are often in lateral position, but are on all sides of the terminal parts of the colony. They are as much as 2 mm. apart on main stem and branches, and about 1 mm. apart on the twigs.

The individual calyces are very low verrucæ, but not entirely included although they closely approach this condition when the polyp is in complete retraction. When partly expanded the calyx may even approach the form of a very short tube, or rather circular band or collar, about 0.5 mm. in height and 1.5 mm. broad at base. The calyx walls are filled with simple spindles which are often curved. Some are bent and more or less horizontal, while others are oblique or even vertical. In a dried fragment where the polyp was fairly well expanded the upper part of the calyx wall was armed with spindles arranged plainly *en chevron*, as in *Anthomuricea*. The polyp is completely retractile, but often rests with the collaret on the margin. The collaret is well marked but narrow, consisting usually of two or three circular rows of spindles. The operculum is composed of the usual three spindles arranged in an acute-angled triangle, reenforced by others in varying numbers. Each of the long sides of the triangle is often composed of two curved spindles lying side by side, instead of a single one.

Spicules: The spicules of the cœnenchyma are small warty spindles lying haphazard. All spicules in this species are rather slender spindles, often curved and covered moderately well with tubercles, seldom exceeding 1.3 mm. in length, being smaller than in other species of the genus.

Color: The colony is gray; axis yellowish-brown with a faint golden luster.

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Locality.—Station 4987; Kamoi Misaki Light, N. 76° E., 3.2 miles; 59 fathoms.

Type-specimen.—Cat. No. 30037, U.S.N.M.

This species differs from others in the genus in the calyces, which are not truly cylindrical, and in the tendency toward a definite *en chevron* arrangement in the calyx walls.

Genus MURICEIDES Wright and Studer (emended by Nutting).

Muriceides STUDER + *Clematissa* STUDER.

Calyces cylindrical or conical, their walls filled with vertically placed spindles, clubs, disks, tri-radiate forms, etc. No crown of points. Spicules on tentacle bases arranged *en chevron*.

MURICEIDES CYLINDRICA, new species.

Plate 11, figs. 1, 1*a*; plate 20, fig. 3.

Colony straggling in habit, 15 cm. in height, soft and flexible, flattened at branch origins, giving off two ramified branches near its base which are at right angles to the other branches. These latter are on the same plane and are very irregularly disposed, there being 6 on one side and 3 on the other. The calyces are irregularly distributed on the branches, but are ordinarily lateral in position although they are on all sides of the distal twigs. On an average they are about 2 mm. apart, although this varies greatly.

The variation in size of individual calyces is also very great. They are tubular in form and are surmounted by the polyp head, which is relatively large. A typical calyx measures a little over 2 mm. to margin and is 1.7 mm. in diameter, and the mass of tentacles and operculum rises about 2 mm. above this. The walls are filled with rather small, short, much tuberculated spindles vertically arranged and ending in jagged, irregular, not conspicuous points around the margin. The polyps are apparently not retractile, all of them resting with the collaret above the margin. Collaret very strong, composed of several transverse rows of rather small spindles aggregated in a conspicuous band.

The operculum is heavy, composed of numerous rather small spindles arranged *en chevron* on basal parts of tentacles and lying parallel in vertical bands on distal parts.

These bands are broad and conspicuous, covering the entire dorsal surfaces of the tentacles. The cœnenchyma of stem and branches is covered with small, stout, warty spindles irregularly disposed, but more often longitudinally arranged.

Spicules: These are all spindles, small for this family, those of calyx walls longer and relatively more slender than those of the cœnen-

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chyma, which are often terete forms, closely tuberculated. Small irregular spicules with expanded bases are sometimes seen. Very rarely they are branched.

Color: The colony is dull yellowish-brown, and the spicules are colorless.

Localities.—Station 4781; lat. 52° 14′ 30″ N.; long. 174° 13′ E.; 482 fathoms (type). ? Station 4895; Ose Saki Light, N. 42° E., 4.7 miles; 95 fathoms.

Type-specimen.—Cat. No. 30046, U.S.N.M.

In general appearance this species resembles the genus *Anthogorgia*, but differs notably from that genus in the arrangement of the opercular spindles and in the size of the spicules in general. A specimen from station 4895 appears to belong to this species, but the calyces are much smaller, as if shrunken.

MURICEIDES NIGRA, new species.

Plate 12, figs. 1, 1*a*; plate 20, fig. 4.

Colony flabellate, resembling *Muricea* or *Plexaura* in general appearance, 17.5 cm. in height and with a spread of 9 cm. The stem is short, and is 6.5 mm. in diameter. A branch is given off 1.7 mm. from its base, and this again branches, throwing off several lateral branchlets, some of which are again divided; 6.6 cm. from its base the stem again divides into two subequal parts each of which bears several lateral branchlets which are directed upward, as in *Plexaura*. The calyces are rather regularly distributed on all sides of the stem and branches without, however, showing any definite order. They are about 2 mm. apart on distal parts of the colony and more widely separated on the proximal parts.

The individual calyces are tubular, a typical one measuring 3 mm. to its margin, and it has a diameter of 2 mm. Many, however, are much shorter. The walls are filled with quite small spindles, irregularly arranged, but with a strong tendency toward a vertical position. The spicules are smaller than in *M. cylindrica*. The polyps are only partially retractile, resting with their collarets above the margins. The collaret is well marked, with 2 to 4 rows of spicules encircling the polyp just below the tentacle bases. The operculum is dome-shaped, moderately high, composed of spicules arranged *en chevron* on tentacle bases, and others forming longitudinal bands of 3 or 4 spicules in width on the distal parts of the tentacles. The cœnenchyma bears small spindles arranged longitudinally.

Spicules: These are mostly spindles which are minute for this family, rather closely tuberculated. There are also a few small, irregular tuberculate forms.

Color: The colony (in alcohol) is very dark brown, almost black. The black color is most unusual among the Gorgonacea. This may,

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however, possibly be due to some action of the preservative or other chemical process.

Locality.—Station 4784; East Cape, Attu Island, S. 18° W., 4 miles; 135 fathoms.

Type-specimen.—Cat. No. 30019, U.S.N.M.

Genus MURICELLA (emended).

Calyces in the form of verrucæ or truncated cones, spicules all spindles vertically arranged except on tentacle bases, where they are *en chevron*. Calyx margin often showing eight blunt points.

MURICELLA RETICULATA, new species.

Plate 14, figs. 1, 1*a*; plate 20, fig. 5.

Colony flabellate and reticulate, 24 cm. in height and with a spread of 15.5 cm. The main stem is straight for much of its length, giving off numerous but irregularly disposed lateral branches, laterally compressed except at basal portion, where it is round and 4 mm. in diameter. On the branch-bearing part it is 5 by 3.5 mm. in section. The main branches are likewise compressed in the same manner, especially in their proximal parts. Those on one side are alternating stubs and large branches which often again divide, usually in a pinnate manner, the ultimate twigs often anastomosing with those of adjacent branches. Branchings of the fourth order are sometimes attained. The branches are about 5 cm. apart. The calyces are thickly distributed on all sides of the branches, but are less abundant on the back of the colony and most abundant on distal parts of the twigs, where they are usually less than 1 mm. apart.

The individual calyces are low cones or short tubes according to the state of retraction of the polyps. A typical calyx measures 1 mm. high to the collaret and is 1.3 mm. broad at the base; but they vary much in size. Their walls are covered with rather heavy warty spindles which often encircle the basal part, but may lie in almost any direction. On the distal parts the spindles are smaller, tending to be vertical, sometimes approaching an *en chevron* arrangement, forming blunt points which arise at regular intervals around the margin. Tentacles armed with strong spindles which are arranged *en chevron* proximally and are longitudinal distally.

Spicules: Besides the spindles in the calyx walls and polyps, there are two sorts found in the cœnenchyma: 1, very large, heavy tuberculate spindles which are placed often at distant intervals and sometimes attain a length of 2.5 mm.; and 2, spindles of much smaller size, often lying deeper on stem and branches, usually longitudinally disposed except where they encircle the calyx bases.

Color: Colony deep chocolate-brown, silvered by the large colorless spicules.

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Localities.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms (type). Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106–95 fathoms.

Type-specimen.—Cat. No. 30045, U.S.N.M.

This species bears a superficial resemblance to *Versluysia ramosa* (Thomson and Henderson)[1]; but the spiculation of calyces and tentacles shows it to be a *Muricella.*

MURICELLA ABNORMALIS, new species.

Plate 11, figs. 3, 3*a*; plate 20, fig. 6.

Colony (incomplete) consisting of three simple, straight, cylindrical branches, joined at their bases. The largest is 7.3 cm. in length and has a diameter of 4.5 mm. The general aspect of the branch is not at all like the typical *Muricella,* but more like the genus *Thesea.* The spiculation, however, shows that it can not belong to the latter genus. The calyces are thickly distributed on all sides, being seldom more than 1.5 mm. apart and usually much closer.

The individual calyces are short cylinders or truncated cones, a typical one measuring 2 mm. in height and 1.9 mm. in diameter. Their walls are filled with loosely embedded long slender spindles, much more delicate than is usual in this genus, vertically disposed in proximal parts and with their distal ends approximated in an *en chevron* arrangement in distal part. Some of these spindles reach from base to beyond the margin of the calyx. Margin with 8 triangular points, usually equidistant, formed by the distal ends of one or more of these spindles.

The polyps are retractile, and their spiculation differs from most species of this genus. There is a distinct, strong collaret composed of two or more circular rows of long, often curved, spindles. The operculum is composed mainly, if not exclusively, of three spindles which are so disposed as to form an acute-angled triangle pointing toward the center of the operculum. This is quite different from other species in the genus.

Spicules: These are all slender, often bent or curved spindles; sometimes attaining a length of 2 mm., but much more slender than is usual in this genus. Their surface is covered with sharply pointed tubercles which are much more thickly distributed on the larger than on the smaller spindles. These spindles, especially when curved, closely resemble many found in the genus *Acanthogorgia.*

Color: Very light yellowish or creamy-white. The axis is brown.

Locality.—Station 5070; Ose Saki, S. 8° W., 1.8 miles; 108 fathoms.

Type-specimen.—Cat. No. 30093, U.S.N.M.

It is with great hesitation that I place this species in the genus *Muricella* on account of the peculiar formation of the pseudo-operculum. Otherwise it goes into the genus easily enough.

[1] Ceylon Pearl Oyster Reports, Supplementary Reports, No. XX, 1905, p. 301.

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Genus THESEA Duchassaing and Michelotti (modified by Nutting).

Calyces verruciform, their walls filled with broad scale-like spindles armed with thorny processes on one side only, the opposite edge being tuberculate. Scales imbricating, the thorny processes being uppermost and overlapping the lower edges of other spicules. Heavy ordinary spindles are also present.

THESEA PLACODERMA Nutting.

Thesea placoderma NUTTING, Muriceidæ of the *Siboga* Expedition, 1910, p. 54.

Colony flabellate, not reticulate, 7.3 cm. in height and with a spread of 4.6 cm.

The main stem is 2 mm. in diameter and gives off a few stubs of branches on one side and a number of simple twigs and two compound branches on the other. Branches of the third order sometimes produced. The distance between branches varies considerably, perhaps averaging 4 to 6 mm. The calyces are mostly lateral, with a few on front and back, particularly on distal parts. They are ordinarily less than 1 mm. apart.

The individual calyces are low verrucæ of variable height, usually not exceeding 1 mm., and about 1.3 mm. in diameter. Their walls are filled with heavy plates or spindles with their upper edges armed with a row of jagged teeth. These scales are imbricating, the teeth pointing upward and outward and surrounding the margin with an irregular series of points. The polyps are retracted to their collarets. The operculum is heavy, each flap being composed mainly of two long spindles with their proximal ends divaricated and their distal ends approximated to form a point near the center of the mass of infolded tentacles.

Spicules: These are of the characteristic *Thesea* type, as described above. The cœnenchyma of stem and branches is covered with scale-like plates with irregular, often jagged, edges.

Color: The axis is dark brown, and the general color of the colony is grayish-brown.

Localities.—Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

The type-locality is in Flores Sea, East Indies, 73 meters.

Genus ACIS Duchassaing and Michelotti (modified by Nutting).

Colony branched, calyces varying in form, their walls and the tentacle bases with spindles not *en chevron*. Spicules of the cœnenchyma very heavy spindles or plates, their edges often fitted as in mosaic.

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ACIS SQUAMATA Nutting.

Acis squamata NUTTING, Muriceidæ of the *Siboga* Expedition, 1910, p. 42.

Colony flabellate, very profusely branched, 6.2 cm. long and with a spread of 5.2 cm. The base is lacking, the part preserved consisting of two main branches which anastomose distally, their basal parts being free. The larger branches are three in number, sending off numerous side branches some of which again divide until branches of the fourth order are produced. Side branches very closely approximated, often not more than 1 mm. apart. The calyces are all anterior or antero-lateral, mostly the latter, close set, less than 1 mm. apart and often contiguous.

The individual calyces are variable in shape, being low verrucæ, short tubes, or truncated cones. A typical one measures 1.7 mm. in height and 2 mm. in diameter. Their walls are armed with large squarish plates often in two, sometimes in three, series. The transverse diameter of these plates is usually longer than the vertical, and their free edges are thin and finely ctenate, the other edges being fitted together forming a complete covering. The free edges are usually rounded. The distal row looks like an operculum composed of a flattened scale for each tentacle, but dissection shows that the true operculum is under these and is composed of two comparatively slender spindles lying longitudinally along the dorsal surfaces of the tentacles. The cœnenchyma is covered with squarish or polygonal plates, their edges nicely fitted. Those on the anterior surface of the colony are much larger than the others, sometimes reaching a length of 4 mm. Those on the back of the colony are small, squarish or polygonal plates averaging not more than 1 mm. in diameter.

The spicules have already been described. They are the heaviest that the writer has seen in the Gorgonacea.

Color: The axis is dark brown, and the polyps are dark umber-brown with a slight purplish tinge. The general surface is white, but the dusky color of the axis and polyps shows through somewhat, imparting a slightly bluish tinge.

Locality.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

The type-locality is Dutch East Indies, near Saleyer Island, 400 meters.

The U. S. Fisheries steamer *Albatross* specimens agree with the type except in the color of axis and polyps, which, in the type, are much lighter. This may be due partly to the fact that the *Siboga* material has been longer preserved in alcohol than that secured by the *Albatross*.

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ACIS SPINIFERA, new species.

Plate 13, figs. 2, 2a; plate 21, fig. 1.

Colony flabellate, straggling in habit, 9.6 cm. in height and with a spread of 10 cm. The main stem is erect, slightly sinuous, 2.5 mm. in diameter. The first branch arises 1.7 cm. from the base. The branches are lateral and, for the most part, sub-opposite, 6 on one side and 7 on the other, about 9 mm. apart on the average, and 1.8 mm. in diameter. Some of them give off branchlets to the fourth order. The calyces are thickly emplanted on all sides of the stem and branches, often less than 1 mm. apart.

The individual calyces are in the form of short cylinders or broadly truncated cones, a typical one measuring 2.4 mm. in height to top of spines and 2 mm. broad at base. The walls are covered with broad scale-like plates, usually broader than long, imbricating. Those of the lower row have free rounded margins which are finely ctenate and overlap the plates of the upper row. The marginal plates have broad bases, the sides of which overlap and are suddenly narrowed distally into prominent spine-like points which surround the margin with a conspicuous crown of points which are somewhat spatulate and often project more than 1 mm. beyond the margin. Usually there are but two rows of plates on each calyx wall, although the edges of the plates of the surrounding cœnenchyma may extend somewhat upward over the basal part of the calyx. The collaret is well developed, consisting of two or more rows of transverse spicules. The operculum is regular, composed of three spindles forming an acute angled triangle.

There are two layers of spicules on the stem and branches. First, an outer layer of heavy plates or scales, usually polygonal, of various shapes and sizes, sometimes with edges nicely fitted; but the larger ones often have the edges more or less imbricated, and are rarely as large as the calyx spicules. Second, a very thin delicate layer of minute rather sparsely distributed spindles.

Spicules: Mostly polygonal plates of various shapes and sizes, the largest usually curved to fit the calyx or branch, attaining a size of 2.5 by 2 mm. The spine scales of the margin are often 2 by 1 mm. There are also spindles from the collaret and operculum, and minute ones from the inner layer of the cœnenchyma.

Color: The colony is tan-brown throughout, and the axis dark golden-brown.

Locality.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

Type-specimen.—Cat. No. 30088, U.S.N.M.

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This form resembles *Acis spinosa* Thomson and Simpson,[1] but differs in color, and has much larger spicules, according to the measurements given by these authors.

Genus PLACOGORGIA Wright and Studer (emended by Nutting).

Colony flabellate, sometimes reticulate; calyces low cones or verrucæ, their walls filled with imbricating disks or "Stachelplatten;" operculum composed of three spindles forming an acute-angled triangle in each opercular flap.

PLACOGORGIA JAPONICA, new species.

Plate 13, figs. 1, 1*a*; plate 21, fig. 2.

Colony (incomplete) 8.4 cm. long. Stem 6 mm. wide at base above which it forks into two very unequal main branches, the smaller of which forms the main part of the specimen. This again forks 1.6 cm. from its origin, and but one of the resultant branches remains. Above this the stem is unbranched for 2.5 cm., when it again forks. The ultimate branchlets are 3 mm. in diameter. The calyces are distributed on all sides, more thickly on the distal parts, forming clusters on the ends of the twigs, and sometimes being as much as 2.5 mm. apart on the proximal parts of the colony.

The individual calyces are low, dome-like verrucæ, a typical one measuring 2.1 mm. in diameter at the base. The calyx walls are filled with spindles or long flattened plates of various forms and variously arranged. Sometimes these plates encircle the base and at others they are all vertical in position, looking like strong spindles. In other cases the plates are haphazard in position, the distal ones with a tendency to be vertical. These vertical spicules are often triangular plates with comparatively straight edges, their acute angles forming a series of irregular points around the margin.

The polyp is retractile, but often rests with the collaret just above the calyx margin. This (the collaret) is strong, composed of two or three rows of encircling spindles. The operculum is composed of three spindles forming an acute-angled triangle on each flap. The points of the triangles thus formed reach almost to the center of the mass of infolded tentacles.

Spicules: These are mostly heavy plates with various contours, but never forked nor conspicuously branched. They are usually oblong, sometimes squarish, triangular, or roughly oval in outline, seldom exceeding 2 mm. in length, and have their corners rounded. There are a few small spindles.

[1] Alcyonaria of the Indian Ocean, vol. 2, 1909, p. 77.

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Color: The axis is brown proximally, lightening distally; colony in general apparently dark brown, but this seems to be accidental, as the spicules when *in situ* are covered with black or dark-brown specks which do not appear in the cleaned spicules. The polyps are umber-brown.

Localities.—Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms. Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms. Station 5070 (type); Ose Saki, S. 8° W., 1.8 miles; 108 fathoms.

Type-specimen.—Cat. No. 30096, U.S.N.M.

This species approaches *Muricella*, on the one hand, in the strong spindles, and *Acis* in some of the plate-like spicules. It bears some resemblance to *Acanthomuricea ramosa* Thomson and Henderson.[1] This species, however, will go very well into the genus *Placogorgia* of authors.

Genus VILLOGORGIA Duchassaing and Michelotti (emended by Wright and Studer).

Colony flabellate, often reticulate; cœnenchyma thin; calyces short; cylinders with an operculum in which each flap is composed of three spindles arranged in an acute-angled triangle. Spicules mainly triradiate or quadriradiate forms, or "Stachelplatten."

VILLOGORGIA BRUNNEA, new species.

Plate 12, figs. 2, 2*a*; plate 21, fig. 3.

Colony flabellate and reticulate, 5.8 cm. high and with a spread of 4.9 cm. Main stem 2 mm. in diameter; 6 mm. from its base it forks into two subequal branches, offshoots of which anastomose. Branchlets opposite and irregularly alternate, some of the distal ones again branching. The distance between branchlets averages about 5 mm. The calyces are mainly lateral, but some are on the front of the colony, irregularly alternate on antero-lateral surface, about 1.5 mm. apart.

The individual calyces are in the form of short cylinders, a typical one measuring 1.3 mm. high to margin and 1.5 mm. broad. They are often more like broadly truncated cones. Their walls are filled with small triradiate and quadriradiate spicules, the points of which are inconspicuous but which are directed slightly upward and outward from the walls. There are no marginal points. The polyps usually rest with their collarets on the margin. Collarets well marked, consisting of two or more circular rows of spindles. Operculum formed mainly of three spindles in the usual position for this genus, forming an acute-angled triangle pointing toward the center of the dome-shaped tentacular mass. There are usually a few accessory spicules parallel with the others.

[1] Alcyonaria of the Indian Ocean, vol. 1, 1906, p. 61.

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Spicules: These are mainly small triradiate and quadriradiate forms and butterfly shapes. Irregularly branched and radiate forms, with a few true spindles and a few clubs and daggers are found.

Color: A rather lively yellowish-brown.

Locality.—Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

Type-specimen.—Cat. No. 30098, U.S.N.M.

Another specimen from the same station is characterized by much more prominent spicules, those on the calyx walls forming evident points.

Genus ELASMOGORGIA Wright and Studer (emended).

Colony simple or sparingly branched, very slender and flexible; calyces very low and distant verrucæ; spicules medium-sized spindles, not attaining the size of those in *Muricella* or *Acis*.

ELASMOGORGIA FILIFORMIS Wright and Studer.

Elasmogorgia filiformis WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 133.

Colony an unbranched stem, very slender and flexible, 47 cm. long, diameter 1 mm.

Although in places the calyces tend to be lateral and alternate, they are really on all sides of the stem, somewhat distant but irregularly spaced, being about 3 mm. apart.

The individual calyces are low conical verrucæ, about 0.7 mm. high and with a basal diameter of about 1.8 mm., although this is hard to estimate because the calyx walls slope so insensibly into the general surface of the cœnenchyma. The calyx walls are filled with small short spindles arranged transversely on lower parts and a few small ones vertically placed around the margin, their ends forming an inconspicuous circlet of points. The polyps are usually completely retracted and almost entirely concealed by the indrawn margins. Some of them, however, rest with the collaret on the margin. The collaret is well marked, consisting of two or more circular rows of spindles. The operculum is strong, each flap consisting of three spindles forming an acute-angled triangle, reenforced by others lying parallel to these, or disposed longitudinally on the distal parts of the tentacles.

The cœnenchyma is filled with a compact layer of short stout spindles lying lengthwise of the stem.

Spicules: These are all rather small spindles for this family, their surface covered with conspicuous verrucæ.

Color: The colony is rather dark brown; axis almost black.

Locality.—Station 4837; Tateisha Zaki Light, S. 53° E., 8 miles; 57 fathoms.

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General distribution.—Type-locality, Arafura Sea, 28 fathoms. Reported by Nutting from California coast, 75–134 fathoms, and Dutch East Indies, 112 meters.

ELASMOGORGIA RAMOSA, new species.

Plate 15, figs. 2, 2*a*; plate 21, fig. 4.

Colony subflabellate in form, 12.5 cm. in height and with a spread of 8.5 cm. Stem sinuous, 3.2 mm. in diameter, giving off irregularly disposed lateral branches at varying distances. Some of these latter branch until branchings of the fourth order are attained.

The branches are slightly clavate at ends, with a distal diameter of 2.3 mm., and near base of 1.7 mm. The calyces are entirely immersed, so that merely the mouths are evident as oval openings in the general surface of the cœnenchyma. The calyx walls are not differentiated from cœnenchyma and are covered with short terete spindles with ctenate edges, sometimes imbricating. The operculum is irregular with mostly longitudinal spicules; sometimes there is an approach to the regular arrangement of three forming an acute-angled triangle.

The spicules are all spindles which are short, small for this family, and covered with verrucæ.

Color: The colony is very light grayish-brown.

Locality.—Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms.

Type-specimen.—Cat. No. 30043, U.S.N.M.

The regular branching seems to be a character which is sufficient to constitute a new species.

Genus MENELLA Gray (emended by Nutting).

Colony sparingly branched; cœnenchyma thick; calyces included, elliptical in cross section. When the polyps are retracted there is a series of 8 soft lobes inside of the calyx margins. Spicules various, true spindles being rare.

MENELLA INDICA Gray.

(The original reference is not accessible to the writer, who identifies this species on the strength of the description given by Wright and Studer, *Challenger* Reports, the Alcyonaria, 1889, p. LIV.)

Colony an unbranched cylindrical stem, 29.5 cm. long, average diameter 1.8 mm., but the diameter near the clavate end is 2.1 mm. Calyces distributed rather unevenly on all sides, the low verrucæ fading almost insensibly into the general surface and making it hard to determine their limits. Two mm. is a common distance from summit to summit. The individual calyces are almost entirely included, distinctly oval in section, less than 1 mm. in height. Diameters 1.3

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and 1.8 mm. The calyx walls are studded with sharp, conspicuous points projecting upward, particularly evident around the margin, where they form a crown of numerous points. Similar projections give a bristling appearance to the entire cœnenchyma. The polyps are completely retractile and are all sunken so that the operculum is considerably below the margin. The operculum is composed of delicate spindles, two of which are nearly parallel along the dorsum of each tentacle.

Spicules: These are exceedingly varied in form. The most conspicuous is a quadriradiate form consisting of a triradiate base from which a much larger, straight, comparatively smooth point arises. This is the form that furnishes the bristling points mentioned above. There are also triradiate and multiradiate forms, symmetrical and unsymmetrical, a few five-pointed stars and ordinary spindles.

Color: The colony is rather dark grayish-brown; the spicules colorless.

Locality.—Station 5071; Ose Saki Light, S. 53.5° W., 2.6 miles; 57 fathoms.

General distribution.—The type-locality is "india" (Gray).

The U. S. Fisheries steamer *Albatross* specimen agrees well with the description given by Wright and Studer. The stem is very flexible, so that it can be tightly coiled without breaking, even after several years immersion in alcohol.

Genus BEBRYCE Philippi (modified by Kölliker).

Cœnenchyma very thin, the outer layer filled with peculiar spicules which are shaped like a collar button and have usually frilled or scalloped margins. They usually have a darker center and lighter marginal area when *in situ*.

BEBRYCE HICKSONI Thomson and Henderson.

Bebryce hicksoni THOMSON and HENDERSON, Ceylon Pearl Oyster Reports; Supplementary Reports, No. XX, 1905, p. 294.

Colony flabellate, rudely pinnate, 10.2 cm. high and with a spread of about 9.4 cm. The main stem is straight and, like the main branches, is distinctly flattened, being 1.5 mm. by 2 mm. in section. The branches are all lateral and in the same plane. One branch is compound and the others are simple on one side of the colony, and there are two compound branches and two short stubs on the other side. Branchings of the fourth order are produced, but there are no anastomoses and no terminal calyces. The calyces are almost all lateral in position, except near the distal ends of twigs, where they are on all sides. Generally they are either alternate or opposite in arrangement.

The individual calyces are conical or dome-shaped; a typical one measures 1.2 mm. in height and 2 mm. in diameter. Their walls are

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filled with small round disks with darker centers and lighter edges. The polyps are retractile, with well-marked collarets consisting of usually three wavy bands of spicules, the convexities lying at the tentacle bases. The operculum is strong, composed of the usual three spindles forming an acute-angled triangle reenforced by other similar spindles, some of which lie along the dorsal surfaces of the tentacles.

Spicules: These are of the characteristic "collar-button" type of this genus, the central stalk or pillar between the two expanded portions being rather longer than in other species, and the edges of the lower, or larger, disks being frilled. There are also a few slender, tuberculate, and often curved spindles.

Locality.—Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms.

General distribution.—Type-locality, Ceylon Seas; also reported from the Dutch East Indies (Nutting).

Family PLEXAURIDÆ.

Axis composed of lime salts and corneous matter, not in regular segments; calyces often included, found on all sides of the stem and branches; spicules various, often club-shaped; cœnenchyma thick, with a regular series of large primary water-vascular canals arranged around the axis cylinder.

Genus EUPLEXAURA Verrill (emended).

Axis consisting of a horny core surrounded by a thick cylinder of horny material extensively impregnated with calcareous matter. Calyces rather large for this family. Spicules mostly short, warty spindles and small crosses.

EUPLEXAURA PINNATA Wright and Studer.

Euplexaura pinnata Wright and Studer, *Challenger* Reports, the Alcyonaria, 1889, p. 144.

Colony subflabellate, straggling in habit. Stem round, 4 mm. thick, unbranched for 4.8 cm. of its length. It then gives off a pair of opposite branches which attain branchings of the fourth order. Above this a number of lateral branches are given off, some opposite, some subopposite and some alternate; all rather distant, the distance varying from 1 cm. to 2.3 cm. The branches are slightly clavate at their ends and have a diameter of about 2.5 mm. The calyces are fairly regularly distributed on all sides of the stem and branches and are completely included in the cœnenchyma, their oval openings alone indicating their presence aside from a slight tumidity around the margins. They are about 1.8 mm. from center to center. The polyps are completely rectractile. The tentacles bear longitudinally disposed curved spindles.

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Spicules: These are all small ovate or terete forms; densely tuberculate clubs, double clubs and sometimes double wheels or collar-button forms, reminding one of the genus *Bebryce*, are also found.

Color: The colony is grayish-brown.

Locality.—Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms.

Type-locality.—Kobe, Japan, 8 and 50 fathoms.

The primary water-vascular canals are not easily made out, and this species is hard to differentiate from some Muriceidæ, such as *Bebryce*.

Family ISIDÆ Gray (modified by Wright and Studer).

Axis composed of alternating calcareous and horny joints, both of which are amorphous.

Genus ACANELLA Gray (amended by Verrill).

Branches arising from the short horny internodes of the axis. No external layer of scale-like spicules.

ACANELLA NORMANI Verrill.

Acanella normani VERRILL, Amer. Journ. Sci. and Arts, vol. 16, 1878, p. 212.

Colony erect, tree-like, 16 cm. high. The root bears heavy branching calcareous processes. The stem with lower nodes shorter and the upper longer, dividing into three main branches about 3 cm. from its base. Each of these gives off usually two, sometimes three branchlets in verticils from its horny nodes. Branchings to the fourth order are attained. The cœnenchyma is thin. The polyps are uniserial and distant on proximal parts of the branches, none on the stem and larger branches, often about 4 mm. apart, sometimes opposite, more closely crowded on distal parts where the terminal ones are often in pairs and larger than the others, sometimes attaining a height of 4.5 mm.

The calyces are variable in shape, sometimes cylindrical, sometimes almost obconical as if on pedicels. Their walls are armed with long sharp spindles, which often project far beyond the margin in eight points. Some of these spicules on the outer side of calyx are very large and strong, running the entire length of the calyx and attaining a length of 3.5 mm. They are often curved and pass obliquely partly around the calyx walls. Their surfaces are covered with minute spinules, as described by Verrill.

Color: The colony is ivory-white with a brownish cast. Polyps golden-brown.

Locality.—Station 4956; Mizunoko Shima Light, N. 22° W., 33 miles; 720 fathoms.

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General distribution.—Type-locality, Atlantic coast of North America, at considerable depths.

Genus BATHYGORGIA Wright and Studer.

Spicules of polyps and cœnenchyma bar-like forms with turgid rounded ends, often biclavate.

BATHYGORGIA PROFUNDA Wright and Studer.

Bathygorgia profunda WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 32.

A fragment secured by the U. S. Fisheries steamer Albatross evidently belongs to this species. It is 11.4 cm. long, and consists mainly of two stems or branches which seem to adhere throughout, a condition which is probably accidental or abnormal.

The longest calcareous joint is 4.2 cm. long. The horny joints are very short. The calyces are distant, unequally distributed on all sides of the stem or branch, and are spaced about 7 mm. apart. There is a small branch given off from near the top of one of the calcareous joints, the polyps vary greatly in size, one of the largest being 4 mm. in height with a diameter of 1.5 mm., somewhat larger distally. There are a number of large, biclavate spicules or bars with enlarged ends. These bar-like forms are mostly longitudinal, but may be oblique on the basal part of the body. They seem to be stuck on to the surface of the cœnenchyma, and attain a length of 2 mm. The upper part of calyx walls and bases of the tentacles bear smaller spicules of the same shape, usually longitudinal in position, but often criss-cross. The dorsal surface of the tentacle on median parts is covered with small bar-like spindles which are mainly transverse.

Spicules: These are all bar-like forms, with turgid ends and surfaces irregularly striated and bearing minute points.

The cœnenchyma is thin and contains numerous minute spicules of the same type.

Color: Orange-brown, with the axis showing plainly through the cœnenchyma. The polyps are dark brown, silvered by the spicules.

Locality.—Station 4766; Koniuji Island, S. 22.5° W., 27 miles; 1,766 fathoms.

Type-locality.—Between Yokohama and the Sandwich Islands, 2,300 fathoms.

Genus CERATOISIS Wright.

Calyces with a crown of needle-like spicules; axis simple or branched; cœnenchyma and often the calyces with oblong lenticular or oval scales with comparatively smooth surfaces.

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CERATOISIS PAUCISPINOSA Wright and Studer.

Ceratoisis paucispinosa WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 28.

A few fragments are ascribed to this species. The largest is a denuded axis 13 cm. long; longest joint, 2.4 cm.; diameter, 1.6 mm. The horny joints are very short.

Another fragment has a few polyps. The calyces are long and slender, curved basally so as to lie along the stem facing upward. Length to tip of spines, 6.5 mm; diameter at margin, 1.8 mm.; near base, 1.3 mm. There are a few remarkably long pointed spines lying vertically in the polyp walls, some of which have their points projecting beyond the margin, forming a very conspicuous crown of points. One of these spicules in 4.5 mm. long. Similar spicules lying loose in the bottle measure 5 mm. in length.

The cœnenchyma of the stem contains a number of sparsely scattered comparatively minute bar-like spicules.

Locality.—Station 5083; Omai Saki Light, N. 23.5° E., 34.5 miles; 624 fathoms.

General distribution.—Type-locality, Hyalonema Grounds, off Japan, 345 fathoms; Hawaiian region (Nutting); Dutch East Indies (Nutting).

CERATOISIS PHILIPPINENSIS Wright and Studer.

Ceratoisis philippinesis WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 27.

A number of large fragments with the cœnenchyma and calyces well preserved are included in the U. S. Fisheries steamer *Albatross* material. This species breaks so easily at the internodes that it is unlikely that complete specimens will be secured by dredging.

There is no evidence of branching, and it is likely that in life the species is a very beautiful rod-like form.

The largest fragment is 13 cm. long and has a diameter of 1.7 cm., including the calyces. One large node is 5.2 cm. long and 4 mm. in diameter, without the cœnenchyma. The surface is smooth, with an appearance of longitudinal striation, and the axis is hollow except at the ends.

The calyces are densely aggregated on all sides of the stem, not in definite verticils but in about ten very irregular longitudinal rows; and quite contiguous.

The individual calyces have long cylindrical bodies tapering below into a thick pedicel. Sometimes they are as much as 1 cm. high to the top of the mass of infolded tentacles. Around the margin there is a regular series of rod-like white spicules alternating with the eight tentacle bases, but not projecting appreciably beyond the tentacles. These spicules are sometimes 3 mm. long and are entirely rod-like in

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form. They have a thick coating of cœnenchyma when the polyps are well preserved. The tentacles have a few irregularly disposed, but mostly longitudinal, much smaller lenticular spicules on the dorsal surface. They often occur in two irregular longitudinal rows. The dorsal surfaces of the pinnules bear minute spicules.

Color: The colony is a bright orange-brown. The axis is white, with the horny nodes brown.

Locality.—Station 5029; lat. 48° 22′ 30″ N.; long. 145° 43′ 30″ E.; 440 fathoms.

General distribution.—Type-locality, off the Philippines, 82 fathoms; Dutch East Indies (Nutting).

Section SCLERAXONIA.

Axis composed of calcareous spicules which are either free or fused into a more or less solid mass.

Family MELITODIDÆ.

Axis composed of alternating horny and calcareous joints both of which have a sclerogorgic basis with free or fused spicules.

Genus MELITODES Verrill.

Colony branched and reticulate; cœnenchyma with an outer layer of spiny spindles or half-sided spindles. Verrucæ rather prominent.

MELITODES DICHOTOMA (Pallas).

Isis dichotoma PALLAS, Elenchus Zoophytorum, 1766, p. 229.

Colony flabellate in form, the base lacking, 11.3 cm. long and with a spread of 6 cm. The main stem is composed of short, alternating horny nodes and calcareous internodes, the former being more swollen. The unbranched portion of the stem is about 4 cm. long, S-shaped. The diameter of the nodes is about 5.5 mm. and of the internodes 3.8 mm.

The branching is dichotomous as a rule, dividing sometimes until the sixth order of branchings are produced. The branches and branchlets gradually decrease in size. The horny nodes at bifurcations from 8.5 mm. to 2.5 mm. apart. There are a few anastomoses in the distal parts of the colony. The calyces are lateral, alternate or opposite as a rule, although they are not infrequently found on the front of the colony, often contiguous.

The individual calyces are low, dome-shaped verrucæ usually about 1 mm. in height and 1.6 mm. in diameter at the base. Their walls are filled with spicules which appear like ctenate scales on superficial view, but are really red spindles which are often curved and from the convex side of which heavy, sometimes branched,

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tubercles arise. These convex edges are what look like ctenate and often imbricating scales on superficial view. There are also many terete spindles, clubs and other forms.

The polyps are completely retractile, the collaret well developed. A pseudo-operculum much like that found in the Muriceidæ is formed by numerous white, often curved spindles arranged longitudinally on the dorsal surfaces of the tentacles and assuming an *en chevron* arrangement on their basal parts.

The cœnenchyma is thick, encrusted with spicules such as are found on the calyx walls.

Color: The colony is brick red and the polyps colorless, in alcohol. Some of the fragments from station 4808 are pink, others white, others yellowish The pink ones have the polyp spicules yellow.

Localities.—Station 4808; Cape Tsiuka, S. 61° W., 10.6 miles; 47 fathoms. Station 4890; Ose Saki Light, N. 2° W., 10 miles; 135 fathoms. Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106 fathoms. Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms. Station 5070; Ose Saki, S. 8° W., 1.8 miles; 108 fathoms.

General distribution.—Type-locality ? (Pallas). Found by the *Challenger* in Torres Strait, and reported by Ridley from South Africa.

Possibly an adequate amount of material and complete specimens would enable one to separate this species into definite groups; but with the material at hand this is impracticable.

Genus PARISIS Verrill (emended by Studer.)

Colony branched, the branches arising from the calcareous segments; calyces prominent; spicules of irregular forms but constituting a tesselated pavement on the surface of the cœnenchyma.

PARISIS FRUTICOSA Verrill.

Parisis fruticosa VERRILL, Bull. Mus. Comp. Zoöl., vol. 1, 1864, p. 37.

The specimens are fragmentary. The largest is a branch, flabellate in form, 6.4 cm. long and 2.8 mm. in diameter; 1.5 cm. from its basal end it gives off a large branch, from a calcareous internode, which forms the main part of the colony. The nodes are 5 to 6 mm. long, fluted and rough on surface. The branchlets are mostly broken off on one side, and on the opposite side there are 4 branches, one of which gives off lateral twigs. One of these twigs is forked distally. The other fragments show some anastomoses.

The calyces are lateral, sometimes opposite, and often subopposite. They are about 2 mm. apart from summit to summit, conical in shape, a typical one being 1.3 mm. high and 2 mm. broad at base. The calyx walls are covered with a mosaic-like pavement of polygonal or irregular spicules, and similar ones cover the cœnenchyma. The specimens are covered with erect, minute, needle-like sponge spicules, as

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described by Wright and Studer. The polyps are entirely retracted, the calyx walls meeting at the point of the cone. The tentacles are destitute of spicules. There are often two large ova or planulæ in the basal part of the calycular cavity.

Spicules: These are rather irregular disks than spindles, with an oval outline, and coarsely tuberculate throughout. Sometimes they are thickly branched and have an irregular outline.

Color: The colony is light yellow or creamy-white. The internodes are brownish.

Localities.—Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106–95 fathoms. Station 4894; Ose Saki Light, N. 41° E., 5 miles; 95 fathoms. Station 4895; Ose Saki Light, N. 42° E., 4.7 miles; 95 fathoms. Station 4935; Sata Misaki Light, N. 58° E., 4.5 miles; 103 fathoms. Station 4936; Sata Misaki Light, N. 21° E., 5.7 miles; 103 fathoms.

General distribution.—Type-locality, Sulu Sea; ?Mauritius (Ridley); off Kei Islands, 103 fathoms (Wright and Studer).

Family GORGONIDÆ.

Colony branched, usually flabellate; axis usually horny, not jointed; calyces lateral; spicules usually in the form of spindles; stem and branches often flattened.

Genus PLATYCAULUS Wright and Studer.

Axis with a calcareous center; calyces prominent; spicules spiny spindles and stellate forms.

PLATYCAULUS DANIELSSENI Wright and Studer.

Platycaulus danielsseni WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 147.

Colony roughly flabellate, profusely branched; the branches, but not the axis, flattened. The axis does not show the calcareous center described by Wright and Studer.

Length 19.5 cm., spread about 18 cm. The stem and proximal parts of main branches are not flattened, although the lateral position of the calyces gives the appearance of a flattening of the branches. The stem is 4.5 mm. in diameter and forks 1.8 cm. from its base. One of the resultant branches is irregularly branched, approaching a pinnate manner of branching, giving off two short simple branchlets and two compound branchlets on one side and three simple branchlets on the other. The other main branch is very profuse and complex in its branching, some of its branchlets being turned down and bound together by parasitic ophiurans. The branches are all lateral and mainly pinnate in their branchings, the side branchlets being lateral and irregular but usually given off at right angles. Branchings of the

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fourth order produced. There are many parasitic ophiurans and anemones on the colony. The calyces are usually lateral in position, but there are a few on the front of some of the ultimate twigs. They vary greatly in their relative position and in the distance between them. The distal branches are distinctly flattened; but the axis is round and very slender, the flattened appearance of the branches being due to the thickening of the cœnenchyma between the lateral calyces.

The calyces are in the shape of domes or short tubes according to the state of contraction of the polyps. Their walls are filled with small spindles and stellate forms, and the region near the margin bears a number of dark red, comparatively heavy, bar-like forms transversely placed. These are continued over the bases of the tentacles and the tentacles themselves, being here longitudinal in position and packing the whole dorsal surfaces of the infolded tentacles.

The cœnenchyma contains very numerous terete spindles with regular whorls of tubercles and also double crosses, crosses, and minute stellate forms packed in several layers.

A cross section of the stem shows a series of well-marked nutrient canals such as are seen in the Plexauridæ, to which this genus is closely allied.

Besides the spicules already described, there are numerous club-shaped forms.

The specimen is exceedingly friable, and fell to pieces in handling. It had been preserved in formalin, and it is barely possible that this had dissolved the calcareous portion of the axis.

Color: The colony is dark red. The spicules are red by reflected light, the bar-like forms being darker, almost crimson and yellowish by transmitted light, which may account for the "amber color" of the original description.

Locality.—The label for this specimen is lost.

Type-locality.—Banda, East Indies.

Genus LEPTOGORGIA Milne Edwards and Haime (emended by Verrill).

Colony flabellate and reticulate; branches flattened and grooved by the water-vascular canals; spicules minute double spindles.

LEPTOGORGIA BERINGI, new species.

Plate 16, figs. 1, 1*a*; plate 21, fig. 5.

Colony flabellate, much branched, 7.9 cm. high and 7.2 cm. broad, base missing. The stem is 2 mm. in diameter, very slightly flattened. The axis is entirely horny. The stem branches 1.8 cm. from its base into four main branches, three of which are large, subequal and irregularly branched, producing branchings of the fifth order. The fourth

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main branch is anterior and gives off a number of lateral branchlets which are unequally distributed, being from 4 to 25 mm. apart. The calyces are very prominent and are mainly lateral but often anterior in position; but the back of the colony is bare. The calyces average about 2 mm. apart.

The individual calyces are tubular in form. A typical one measures 2.5 mm. to the top of the infolded tentacles, and 1.3 mm. in diameter. Its walls are filled with small fusiform spindles, closely packed, with no definite arrangement. Toward the margin there is a tendency to form eight broad shallow longitudinal folds, extending upward over the bases of the tentacles and forming a thick crest on their dorsal surfaces and eight lobes to the calyx margin. The distal parts of the tentacles are completely hidden and bear few if any spicules.

The spicules are very small short terete spindles, densely tuberculate, the tubercles forming regular whorls around the body of the spicule. Sometimes there is a girdle without tubercles around the center, forming double spindles or double heads.

The cœnenchyma of the stem and branches is packed with similar spindles, usually longitudinal in position.

Color: The colony is very light yellowish, almost cream color. The axis is dark brown proximally, lightening distally.

Locality.—Station 4780; lat. 52° 01′ N.; long. 174° 39′ E.; 1,046 fathoms.

Type-specimen.—Cat. No. 30044, U.S.N.M.

This species seems to be a *Leptogorgia* according to the definition given by Verrill, but has longer and more prominent calyces than any other species of the genus of which I can find description.

Genus CALLISTEPHANUS Wright and Studer.

Colony feebly branched; axis horny and calcareous; calyces dome-shaped; cœnenchyma thick; spicules spiny spindles, clubs and half-sided warty clubs.

CALLISTEPHANUS PACIFICUS, new species.

Plate 14, figs. 2, 2*a*; plate 21, fig. 6.

Colony flabellate in form, 7.3 cm. high and 6.4 cm. broad, diameter of stem 1.8 mm.; 1.4 cm. above its base the main stem produces two opposite branches, projecting at right angles, but afterwards bent upward. One of these is unbranched and the other bears three branchlets on one side; 1.1 cm. above these the stem bends suddenly, giving off from its convex side another branch; 4 mm. above this it bears a large branch, then an opposite pair and a simple branch on one side. The distance between branches varies from 4 to 11 mm.

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The calyces are lateral, sometimes alternate and sometimes opposite, and about 3 to 4 mm. apart from summit to summit.

The axis effervesces slightly in acid, but has no definite calcareous center.

The individual calyces are conical in shape, sometimes tubular. A typical one measures 1.2 mm. in height and 2.2 mm. in diameter. The calyx walls are filled with irregularly placed small spindles, giving a granular appearance. The polyps are retractile, but often rest with the collaret on the calyx margin, and the tentacles are held in a vertical position, except their tips, making a subcylindrical mass with 8 corrugations. The collaret consists of several rows of rather small warty spindles. The tentacles are armed with numerous similar spindles arranged *en chevron* basally and in several longitudinal rows distally.

The cœnenchyma of stem and branches is filled with spicules similar to those in the calyx walls, with occasional stout, blunt-ended, bar-like forms irregularly placed.

Spicules: These are exceedingly varied in form. There are regular warty spindles, small double spindles, radiate forms, clubs, etc., besides the very peculiar bar-like forms mentioned above. These are thicker and denser than the others, and more deeply colored, being an intense crimson while the others are nearer brick red or scarlet, 3 mm. long.

Color: The colony is light crimson in color, axis dark brown.

Locality.—Station 4781; lat. 52° 14′ 30″ N.; long. 174° 13′ E.; 482 fathoms.

Type-specimen.—Cat. No. 30024, U.S.N.M.

This species, although bearing a very close resemblance to *Callistephanus koreni* Wright and Studer, differs materially in its spicules, particularly in the bar-like forms which are quite abundant and characteristic: Geographical considerations render it unlikely that the two are identical.

Family GORGONELLIDÆ.

Axis consisting of a homogeneous calcareous structure or of a calcareous core, not jointed, often fluted by the impressions of the water-vascular canals. Spicules usually girdled forms such as double heads, stars, and double clubs.

Genus SCIRPEARELLA Wright and Studer.

Gorgonellidæ which are simple or branched, not reticulate; calyces in spirals or oblique rows in adult specimens, lateral in young colonies, rather prominent; cœnenchyma rather thick, with spiny spindles and double heads.

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SCIRPEARELLA GRACILIS Wright and Studer.

Scirpearella gracilis WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 156.

Colony incomplete, unbranched. Axis stony, round, 1.9 mm. in diameter. The specimen is 29 cm. long, with a basal diameter of 3 mm. and a distal diameter of 2 mm.

The calyces are in four rows or two pairs of rows, those of each row of a pair alternating with those of the other row of that pair. Individual calyces low conical verrucæ with the point inclined toward distal end of the colony, 0.9 mm. in diameter at base and 1 mm. high. The walls are filled with minute spicules most of which are warty double heads. The polyps are retractile, and the dorsal surface of the tentacles is packed with small well tuberculated spindles longitudinally arranged.

The spicules are all small, most of them being densely tuberculate double heads or spiny spindles with a distinct depression around the middle. There are also a number of small crosses and a very few minute ordinary spindles.

Color: The colony is very light grayish with a pinkish tinge.

Locality.—Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106–95 fathoms.

General distribution.—The type-locality is off the New Hebrides, 130 fathoms. The species is also widely distributed in the Indian Ocean, Dutch East Indies, etc.

SCIRPEARELLA RUBRA Wright and Studer.

Scirpearella rubra WRIGHT and STUDER, *Challenger* Reports, the Alcyonaria, 1889, p. 107.

A single fragment 13.2 cm. long was secured. The calyces are more nearly tubular than in the last species, nearly 2 mm. high and 1.8 mm. wide at base. The margin shows 8 shallow lobes or corrugations. The spicules are much as in the last species, but the girdle around their middle is less conspicuous and often obliterated. A few of the polyps are much larger than the others, sometimes measuring 2.5 mm. high and 3.7 mm. in diameter at the base. On one of these being opened the body cavity was seen to be filled with an oval mass whose nature was not ascertained.

Locality.—Station 4893; Ose Saki Light, N. 29° E., 5.5 miles; 106–95 fathoms.

General distribution.—The type-locality is on the Hyalonema Grounds, off Japan, 345 fathoms. It is also found in the Dutch East Indies (Nutting).

Suborder SCLERAXONIA.

Gorgonacea with an axis cylinder composed of calcareous spicules, fused or free, immersed in a more or less fleshy matrix.

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Family BRIAREIDÆ.

Scleraxonia with a pseudo-axis composed of closely packed spicules which are not fused.

Genus PARAGORGIA.

Colony upright, branched; axis with large water-vascular canals; siphonozooids present.

PARAGORGIA NODOSA Koren and Danielssen.

Paragorgia nodosa KOREN and DANIELSSEN, Nye Gorgonider og Pennatulider tilhorende Norges Fauna, 1883, p. 18.

Colony consisting of a thick stem with short, simple clavate branches, 17 cm. long, 9 mm. in diameter at base. The stem is strongly arched throughout so that its distal end points downward, perhaps on account of being forced into a small bottle. The stem gives off a number of branches from all sides, some of which are merely irregular nodules seated immediately on the stem, and others are clavate branches. One of these is 3.4 cm. long, 4 mm. in diameter near its base, and 14 mm. across the thickest part of the nodulated, club-shaped distal end. These end swellings are sometimes more like rude nodulated spheres than clavate in form, and at times such spheres are seated directly on the stem without evident pedicels.

Nearly all of the polyps are situated on these nodulated portions. In one case there are about 18 calyces situated on one of these spherical terminations of a branch. The calyces are about 6.5 mm. apart, from opening to opening. Occasionally a polyp is seated on a main stem or branch, where it may be the beginning of a new branch.

The individual calyces are low verrucæ with 8-lobed margins, about 3 mm. in height and 6 mm. in diameter at the base. Small polyps appear in the spaces between the larger ones. The polyps are completely retractile, and in retraction the tip of the infolded tentacles are far below the calyx margin, the latter itself being involuted during the complete retraction of the polyp. The tentacles bear longitudinal spindles.

The zooids are minute, and their external openings so tightly closed in alcoholic material as to be invisible. On dissection they can be seen in considerable numbers just beneath the surface. They appear to have but a single mesentery.

A cross section of a branch shows the undifferentiated axis to be composed almost entirely of an aggregation of small spindles traversed by large and conspicuous longitudinal canals of the water-vascular system.

Spicules: These are mostly rather small irregular tuberculate spindles, and a few irregular minute double-heads, crosses, etc. The spicules in the pseudo-axis are mostly white in color.

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Color: The colony is a light red, tending toward a salmon color. The polyps are yellow, with red spicules.

Locality.—Station 4772; lat. 54° 30′ 30″ N.; long. 179° 14′ E.; 344–372 fathoms.

General distribution.—The type was from Norwegian waters, 300 fathoms.

PARAGORGIA REGALIS, new species.

Plate 15, figs. 1, 1*a*; plate 21, fig. 7.

Two large specimens of this superb species were secured, but they are so friable that it is impossible to remove them without much breakage from the narrow-necked jar in which they were preserved. The largest specimen is about 30 cm. in height, rudely flabellate in form. The main stem is round and about 1.2 cm. in diameter. The axis is composed mainly of closely packed spindles and is traversed by numerous water-vascular canals.

There are two lateral stubs of branches on the lower part of the main stem. Above these the stem forks, and at the base of one of the resultant branches a small furcate branch is given off. Each of the main branches gives off several small laterals, and these again fork, and this mode of branching continues until the ultimate branches are produced. All of the branches and twigs are round, nodulated in places and terminate in rounded knobs. A typical end knob is 5.5 mm. in diameter, while the twig supporting it is but 2 mm. across. Branchings up to the eighth order are produced.

The calyces are inserted on three sides of the branches, nodules and terminal swellings, being more thickly implanted on the distal parts of the colony, lacking on stem and larger branches and seldom seen on the backs of the branches except on the terminal swellings.

The individual calyces are almost entirely included, being indicated merely by slight swellings around their openings. The margins are divided into 8 distinct lobes. Young polyps are scattered among the larger ones and are of all sizes up to the maximum. The largest verrucæ are about 2 mm. in diameter, and some of the smallest are hard to discriminate from zooids. The calyx walls are packed with small terete spindles, as is the general surface of the cœnenchyma. The polyps are completely retractile. The upper parts of the polyp bodies are armed with 8 longitudinal bands of small red spindles, very short and stout and longitudinally arranged. These bands broaden at the tentacle bases and pass on up the dorsal surfaces of the tentacles, where they are usually transversely placed, but may lie in any direction.

The smaller or rudimentary polyps so intergrade with zooids, if the latter are present, that it is hard to determine which is which. Possibly the zooids are lacking altogether.

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Spicules: These are mostly small, rather slender and straight, irregularly tuberculate spindles. There are a few minute double heads, crosses, etc. The spindles are rather larger and more slender, especially those of the axis, than in *P. nodosa*. Those of the axis are usually white or colorless.

Color: The colony is a light, clear, brick-red, which fades to nearly white at the base of the main stem.

Locality.—The type and one other specimen were found at station 5079; Omai Saki Light, N. 29° E., 24 miles; 475–505 fathoms.

Type-specimen.—Cat. No. 30018, U.S.N.M.

This is a very well marked species, with much smaller calyces and less well differentiated zooids than the last. Its size is far beyond the maximum of the type of the genus, *P. nodosa*, and both the nodules and individual calyces are much less prominent.

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EXPLANATION OF PLATES.

The photographs were made from nature by C. C. Nutting.

The spicules were drawn under the camera lucida by Dayton Stoner.

PLATE 1.

Fig. 1. *Clavularia japonica*, natural size; 1*a*, single calyx × 4.3.
2. *Clavularia sulcata*, natural size; 2*a*, single calyx × 4.3.
3. *Lithophytum roseum*, natural size; 3*a*, portion of colony × 4.3.

PLATE 2.

Fig. 1. *Dendronephthya nigripes*, natural size; 1*a*, part of branch × 4.3.
2. *Dendronephthya magnacantha*, natural size; 2*a*, part of branch × 4.3.
3. *Dendronephthya oviformis*, natural size; 3*a*, part of branch × 4.3.
4. *Bellonella flava*, natural size; 4*a*, part of colony × 4.3.

PLATE 3.

Fig. 1. *Alcyonium kükenthali*, natural size; 1*a*, part of surface × 4.3.
2. *Anthomastus japonicus*, natural size; 2*a*, zooids on surface × 4.3.
3. *Nidalia gracilis*, natural size; 3*a*, part of colony × 4.3.

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PLATE 4.

Fig. 1. *Pennatula brevipenna*, natural size; 1*a*, single leaf × 4.3.
2. *Pennatula longistyla*, natural size; 2*a*, part of leaf × 4.3.
3. *Ptiloscarcus brevicaulis*, natural size; 3*a*, single leaf × 4.3.

PLATE 5.

Fig. 1. *Pennatula rubescens*, natural size; 1*a*, single leaf × 4.3.
2. *Halisceptrum album*, natural size; 2*a*, single leaf × 4.3.
3. *Pennatula inermis*, single leaf × 4.3.

PLATE 6.

Fig. 1. *Protoptilum orientale;* 1*a*, end of colony × 4.3.
2. *Kophobelemnon hispidum*, natural size; 2*a*, single tentacle × 4.3.
3. *Umbellula eloisa*, natural size; 3*a*, single tentacle × 4.3.
4. *Balticina pacifica*, part of colony × 4.3.

PLATE 7.

Fig. 1. *Thouarella recta*, natural size; 1*a*, part of branch × 4.3.
2. *Helicoptilum rigidum*, natural size; 2*a*, part of colony × 4.3.
3. *Trichoptilum spinosum*, natural size; 3*a*, group of polyps × 4.3.

PLATE 8.

Fig. 1. *Plumarella adhærans*, natural size; 1*a*, part of branch × 4.3.
2. *Plumarella spicata*, natural size; 2*a*, part of branch × 4.3.

PLATE 9.

Fig. 1. *Thouarella alternata*, natural size; 1*a*, part of branch × 4.3.
2. *Primnodendron superbum*, natural size; 2*a*, part of branch × 4.3.

PLATE 10.

Fig. 1. *Acanthogorgia fusca*, natural size; 1*a*, part of branch × 4.3.
2. *Thouarella striata*, natural size; 2*a*, part of branch × 4.3.

PLATE 11.

Fig. 1. *Muriceides cylindrica*, natural size; 1*a*, part of branch × 4.3.
2. *Acanthogorgia paradoxa*, natural size; 2*a*, part of branch × 4.3.
3. *Muricella abnormalis*, natural size; 3*a*, part of branch × 4.3.

PLATE 12.

Fig. 1. *Muriceides nigra*, natural size; 1*a*, part of branch × 4.3.
2. *Villogorgia brunnea*, natural size; 2*a*, part of branch × 4.3.

PLATE 13.

Fig. 1. *Placogorgia japonica*, natural size; 1*a*, part of branch × 4.3.
2. *Acis spinifera*, natural size; 2*a*, part of branch × 4.3.
3. *Anthomuricea aberrans*, natural size; 3*a*, part of branch × 4.3.

PLATE 14.

Fig. 1. *Muricella reticulata*, natural size; 1*a*, part of branch × 4.3.
2. *Callistephanus pacificus*, natural size; 2*a*, part of branch × 4.3.

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PLATE 15.

Fig. 1. *Paragorgia regalis*, natural size; 1*a*, part of branch × 4.3.
2. *Elasmogorgia ramosa*, natural size; 2*a*, part of branch × 4.3.

PLATE 16.

Fig. 1. *Leptogorgia beringi*, natural size; 1*a*, part of branch × 4.3.
2. *Calyptrophora ijimai*, natural size.
3. *Calyptrophora ijimai*, natural size, showing symbiotic annelid and the remarkable structure of metamorphosed spicules created by its presence.

PLATE 17.

Fig. 1. *Clavularia sulcata*. Four spicules, *a*, *b*, *c*, and *d*, × 120.
2. *Clavularia japonica*. Four spicules, *a*, *b*, *c*, and *d*, × 250.
3. *Lithophytum roseum*. Three spicules, *a*, *b*, and *c*, × 250.
4. *Dendronephthya nigripes*. Three spicules, *a*, *b*, and *c*, × 64; *b* is about one-half total length.
5. *Dendronephthya magnacantha*. Two spicules, *a* and *b*, × 64.
6. *Dendronephthya oviformis*. Two spicules, *a* and *b*, × 64.

PLATE 18.

Fig. 1. *Alcyonium kükenthali*. Three spicules, *a*, *b*, and *c*, × 120.
2. *Nidalia gracilis*. Three spicules, *a*, *b*, and *c*, × 250.
3. *Bellonella flava*. Five spicules, *a*, × 250; *b*, *c*, *d*, and *e*, × 88.
4. *Anthomastus japonicus*. Two spicules, *a* and *b*, × 250.
5. *Helicoptilum rigidum*. Two spicules, *a* and *b*, × 64.
6. *Plumarella spicata*. Three spicules, *a* and *b*, × 120; *c*, × 250.

PLATE 19.

Fig. 1. *Plumarella adhærans*. Three spicules, *a*, *b*, and *c*, × 120.
2. *Thouarella recta*. Three spicules, *a* and *b*, × 120; *c*, circumopercular scale, × 120.
3. *Thouarella alternata*. Four spicules, *a*, circumopercular scale, × 64; *b*, *c*, and *d*, × 88.
4. *Primnodendron superbum*. Three spicules, *a*, *b*, and *c*, × 88.
5. *Acanthogorgia fusca*. Four spicules, *a*, *b*, *c*, and *d*, × 64.

PLATE 20.

Fig. 1. *Acanthogorgia paradoxa*. Three spicules, *a*, *b*, and *c*, × 88.
2. *Anthomuricea aberrans*. Three spicules, *a*, *b*, and *c*, × 88.
3. *Muriceides cylindrica*. Five spicules, *a*, *b*, *c*, *d*, and *e*, × 64.
4. *Muriceides nigra*. Three spicules, *a*, *b*, and *c*; *a* and *c*, × 88; *b*, × 64.
5. *Muricella reticulata*. Three spicules, *a* and *b*, × 64; *c*, × 88.
6. *Muricella abnormalis*. Two spicules, *a* and *b*, × 64.

PLATE 21.

Fig. 1. *Acis spinifera*. Four spicules, *a*, *b*, *c*, and *d*, × 64.
2. *Placogorgia japonica*. Three spicules, *a*, *b*, and *c*, × 88.
3. *Villogorgia brunnea*, Four spicules, *a*, *b*, *c*, and *d*, × 120.
4. *Elasmogorgia ramosa*. Three spicules, *a*, *b*, and *c*, × 88.
5. *Leptogorgia beringi*. Two spicules, *a* and *b*, × 250.
6. *Callistephanus pacificus*. Six spicules, *a*, *b*, *c*, *d*, *e*, and *f*, × 120.
7. *Paragorgia regalis*. Two spicules, *a* and *b*, × 88.

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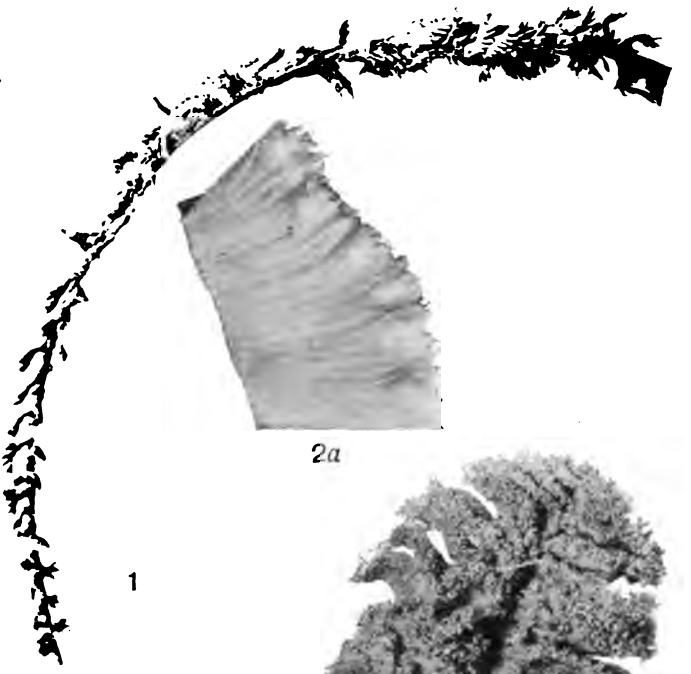

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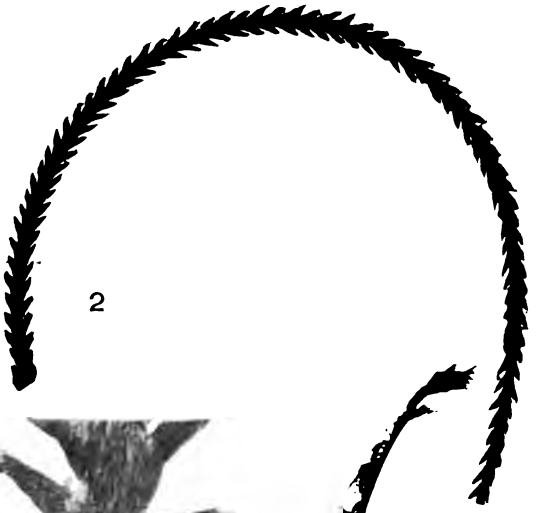

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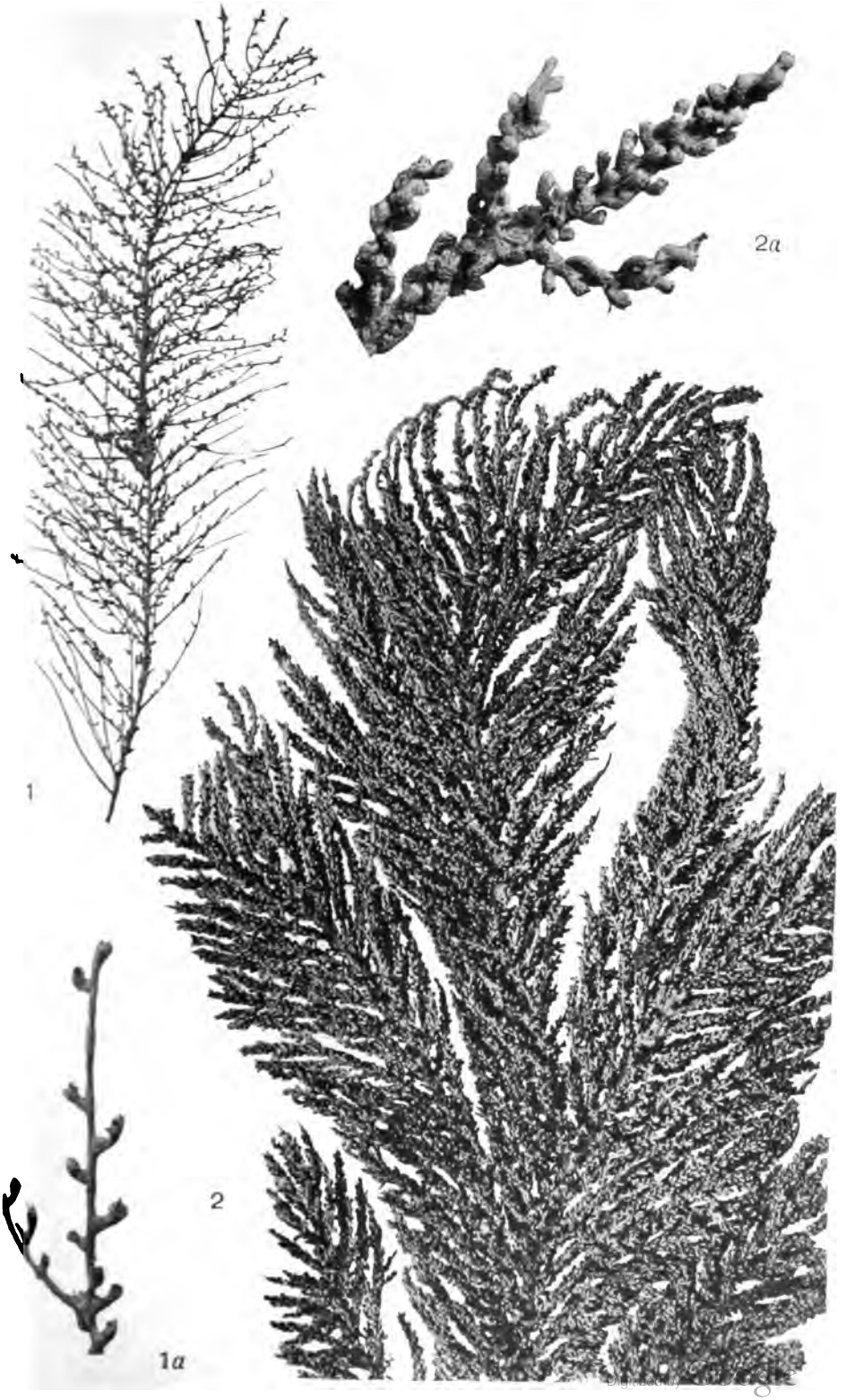

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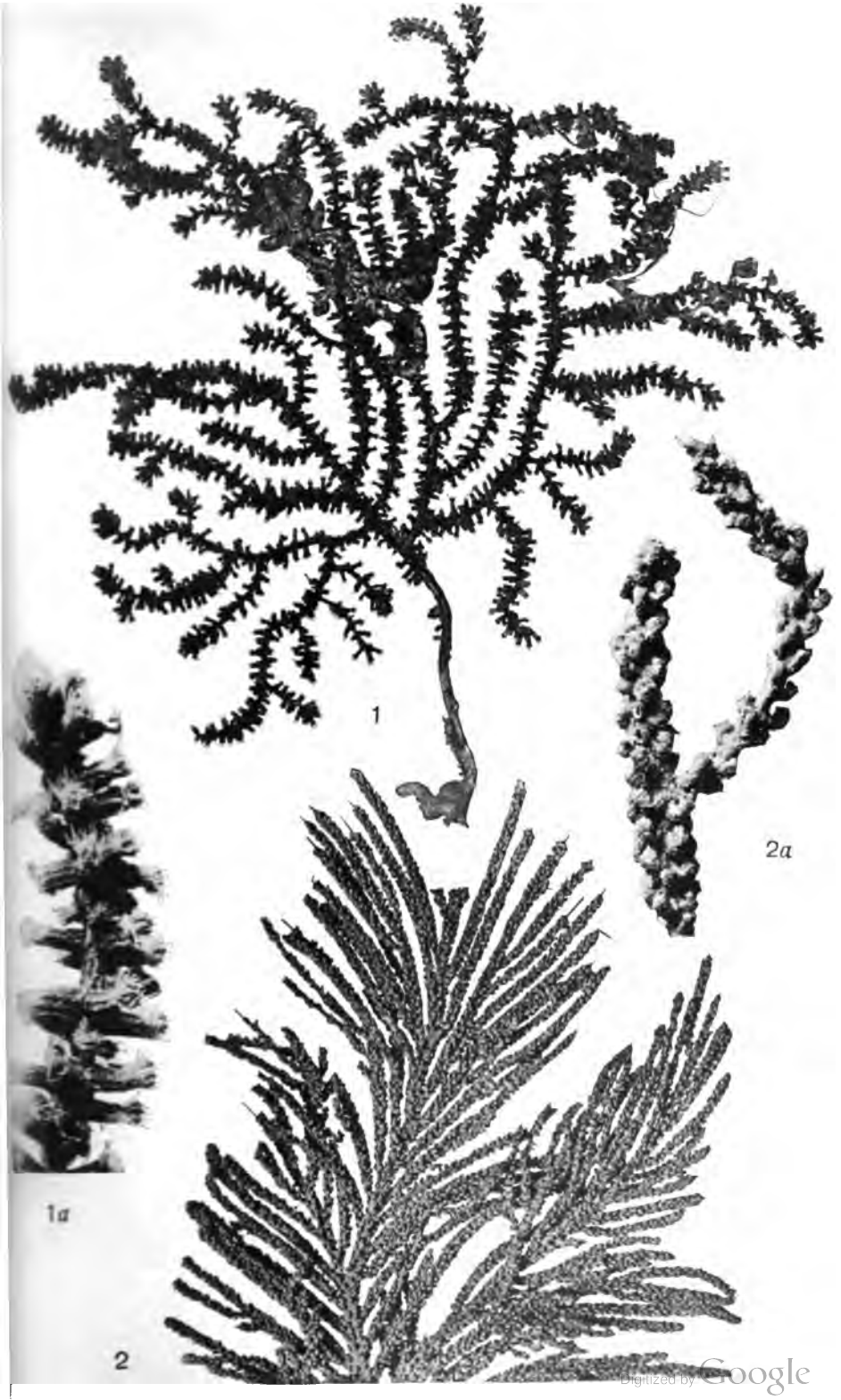

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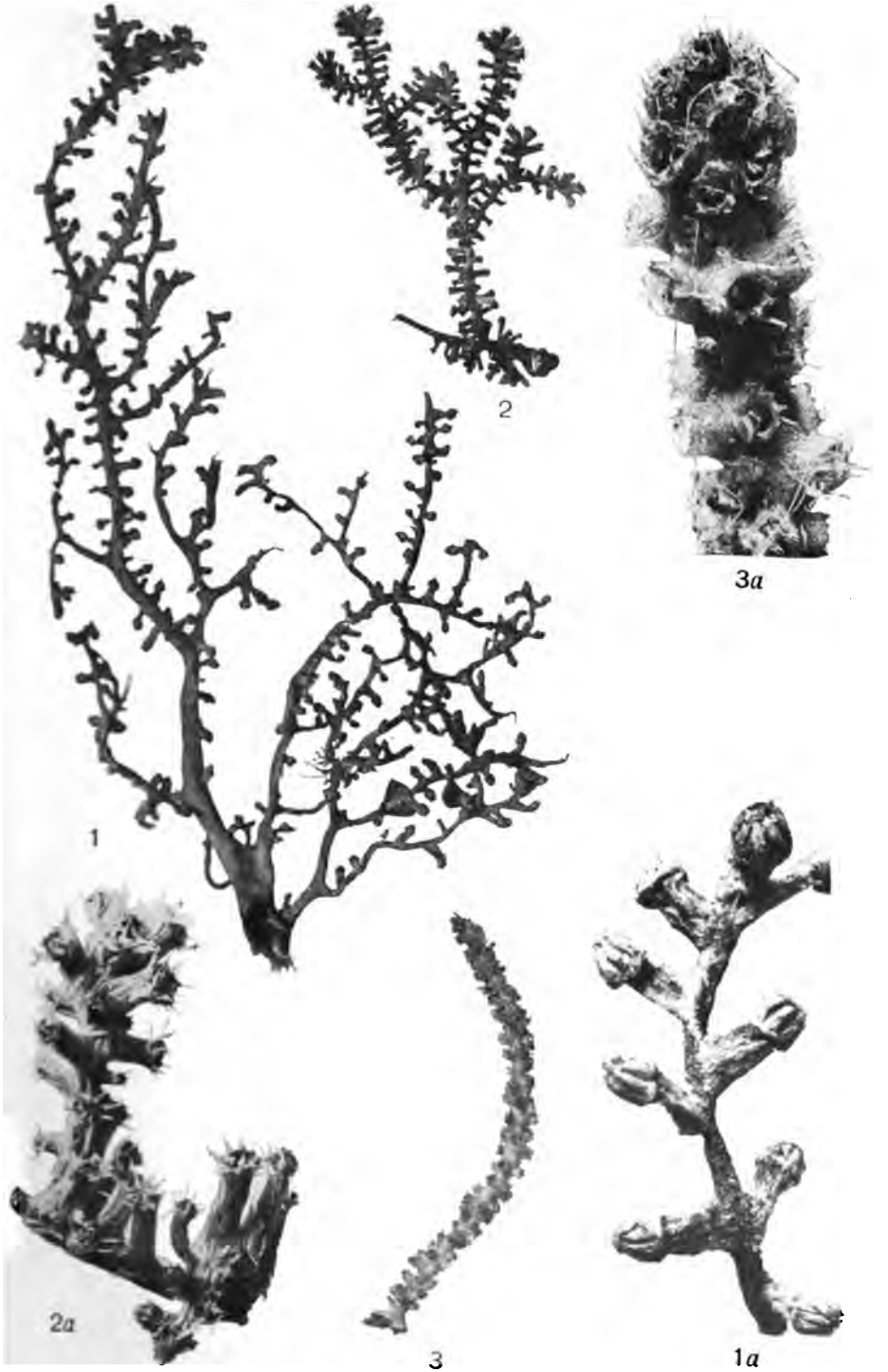

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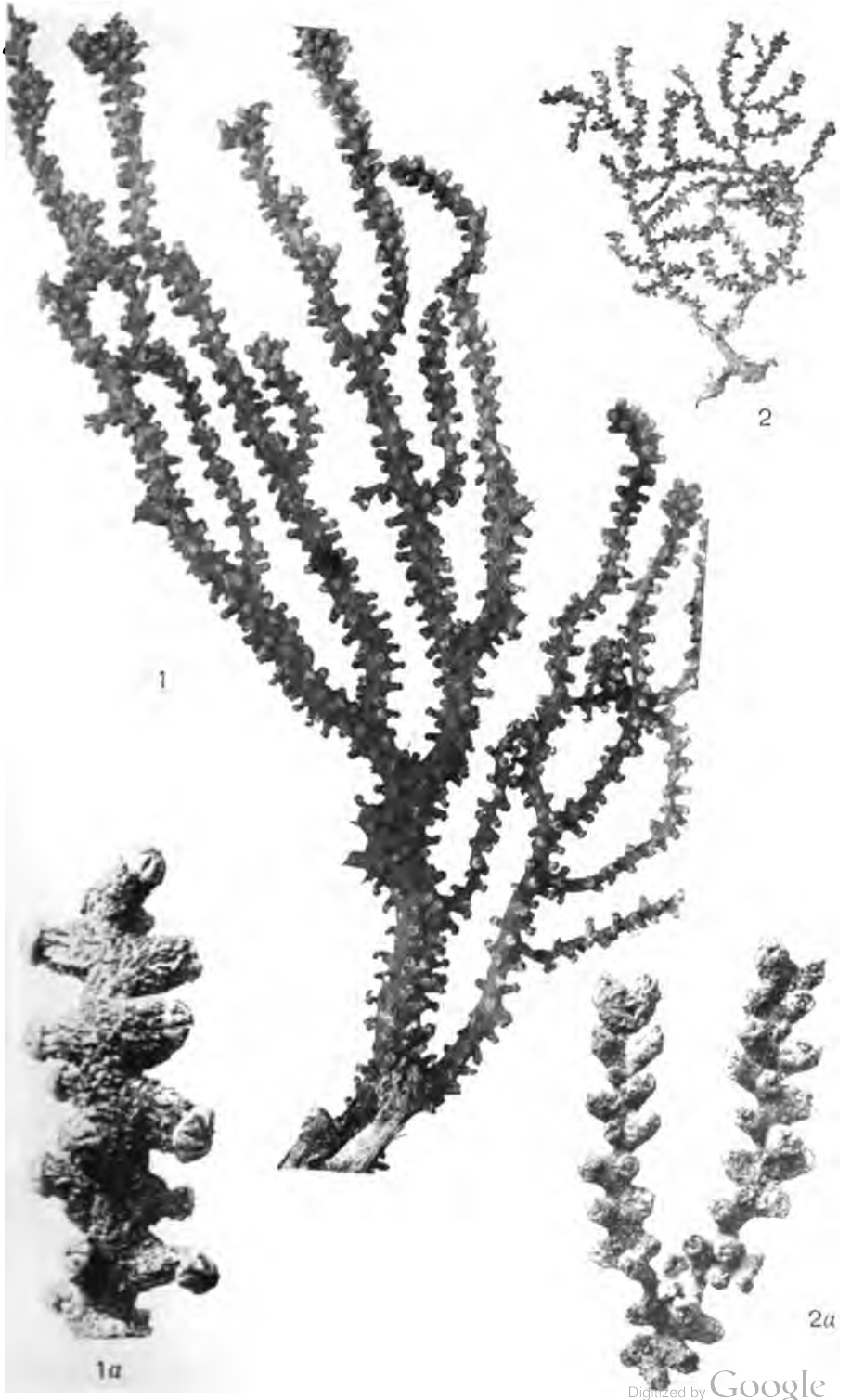

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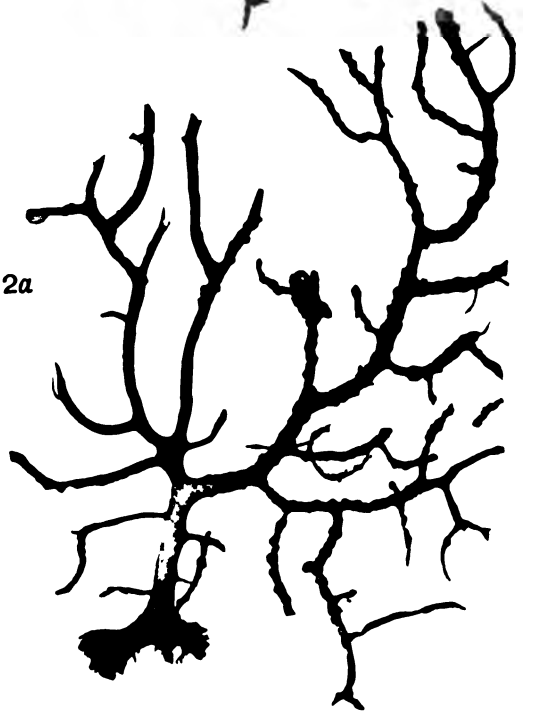

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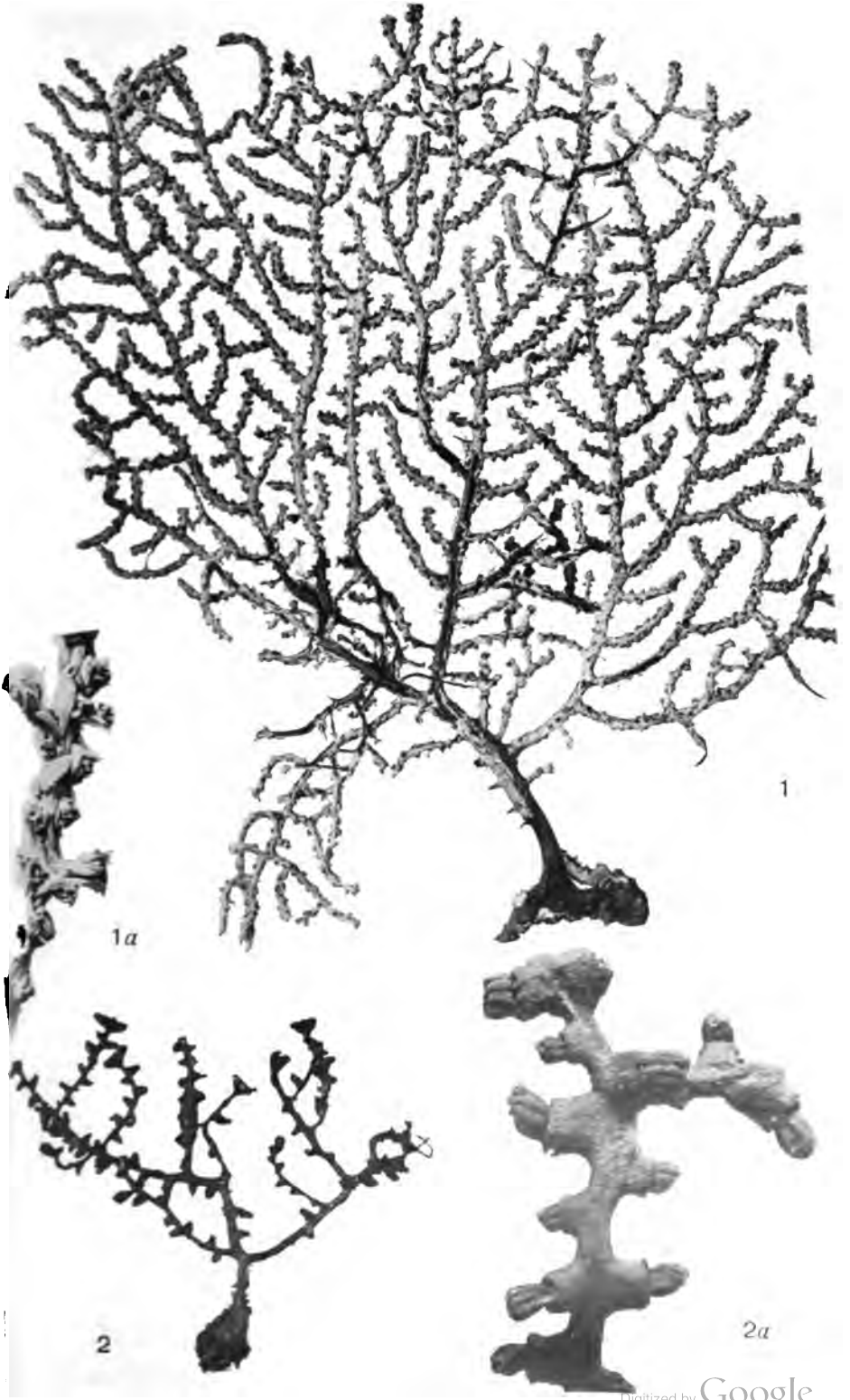

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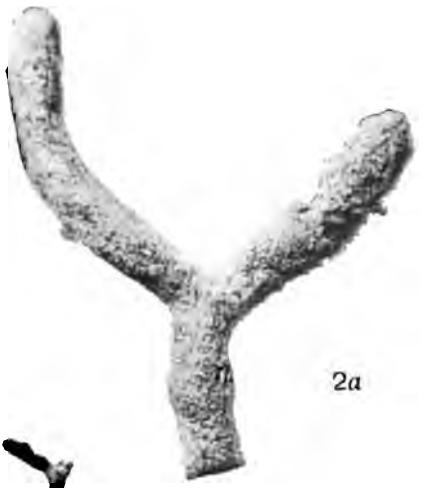

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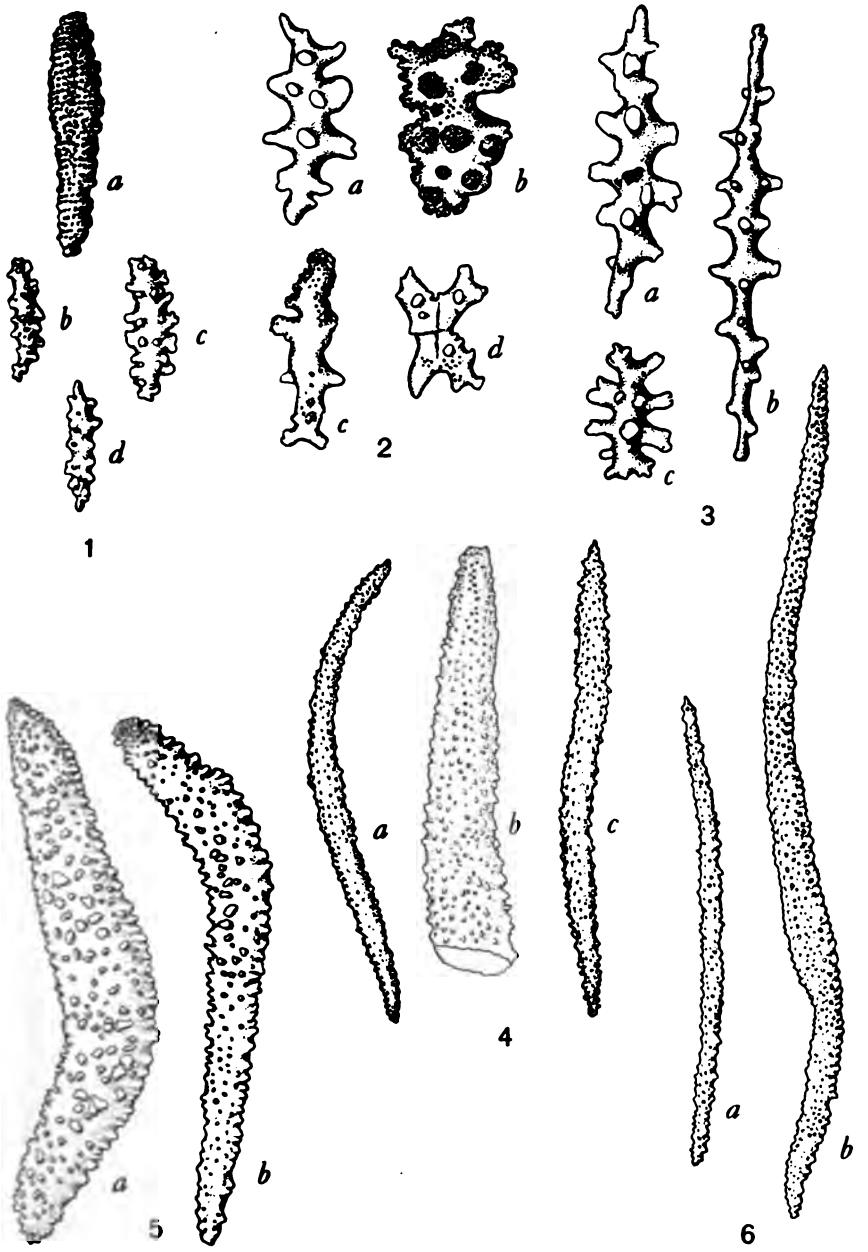

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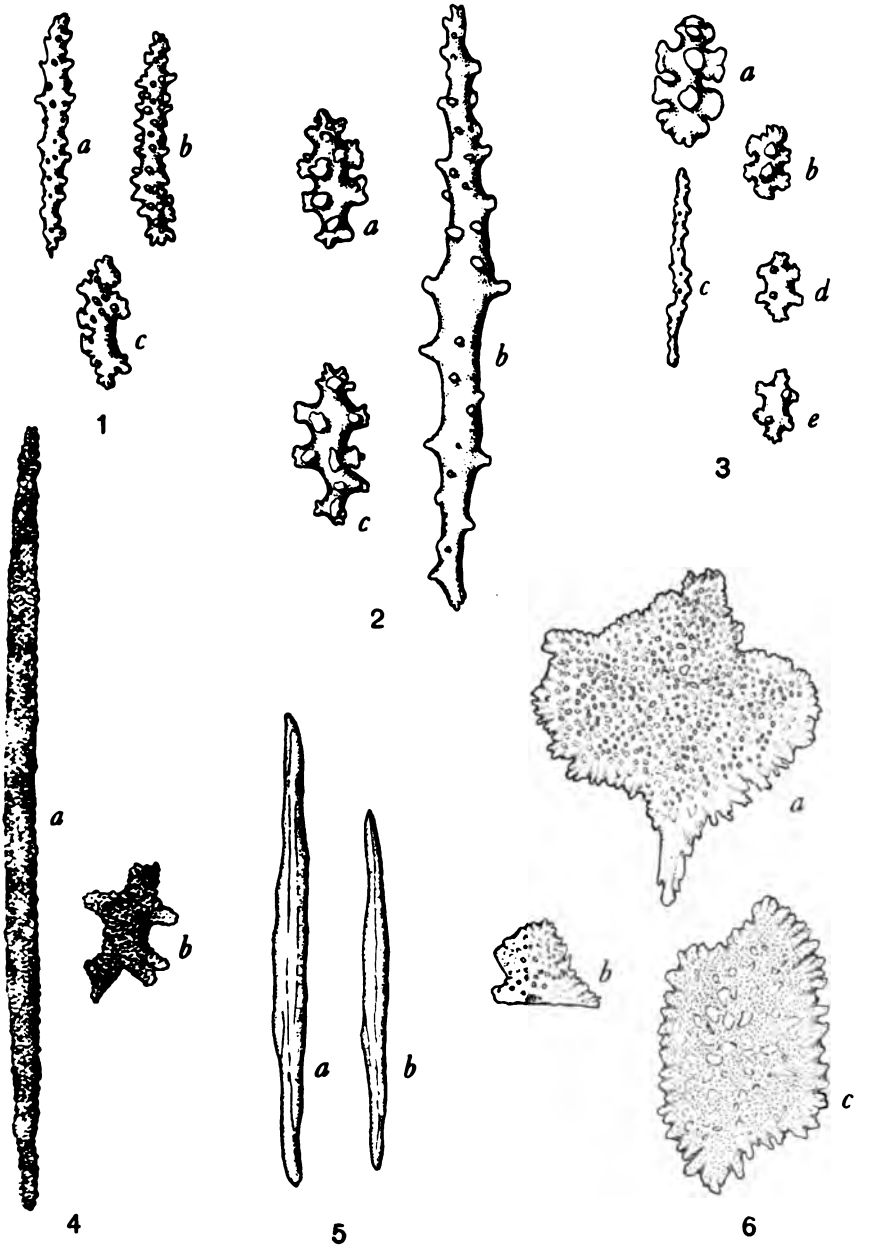

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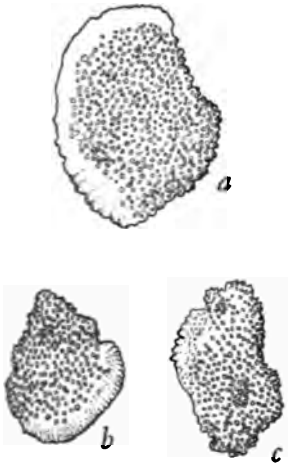

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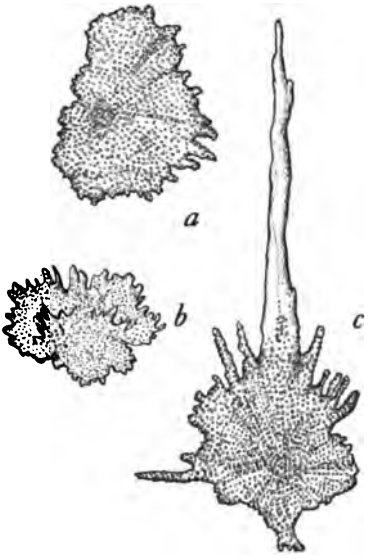

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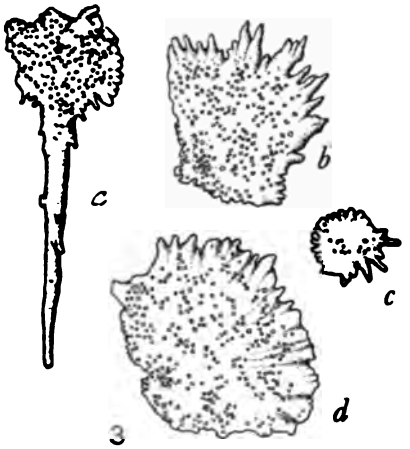

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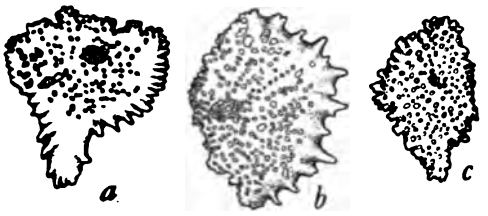

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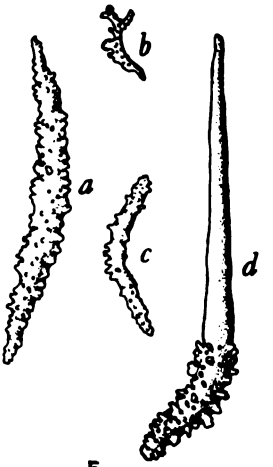

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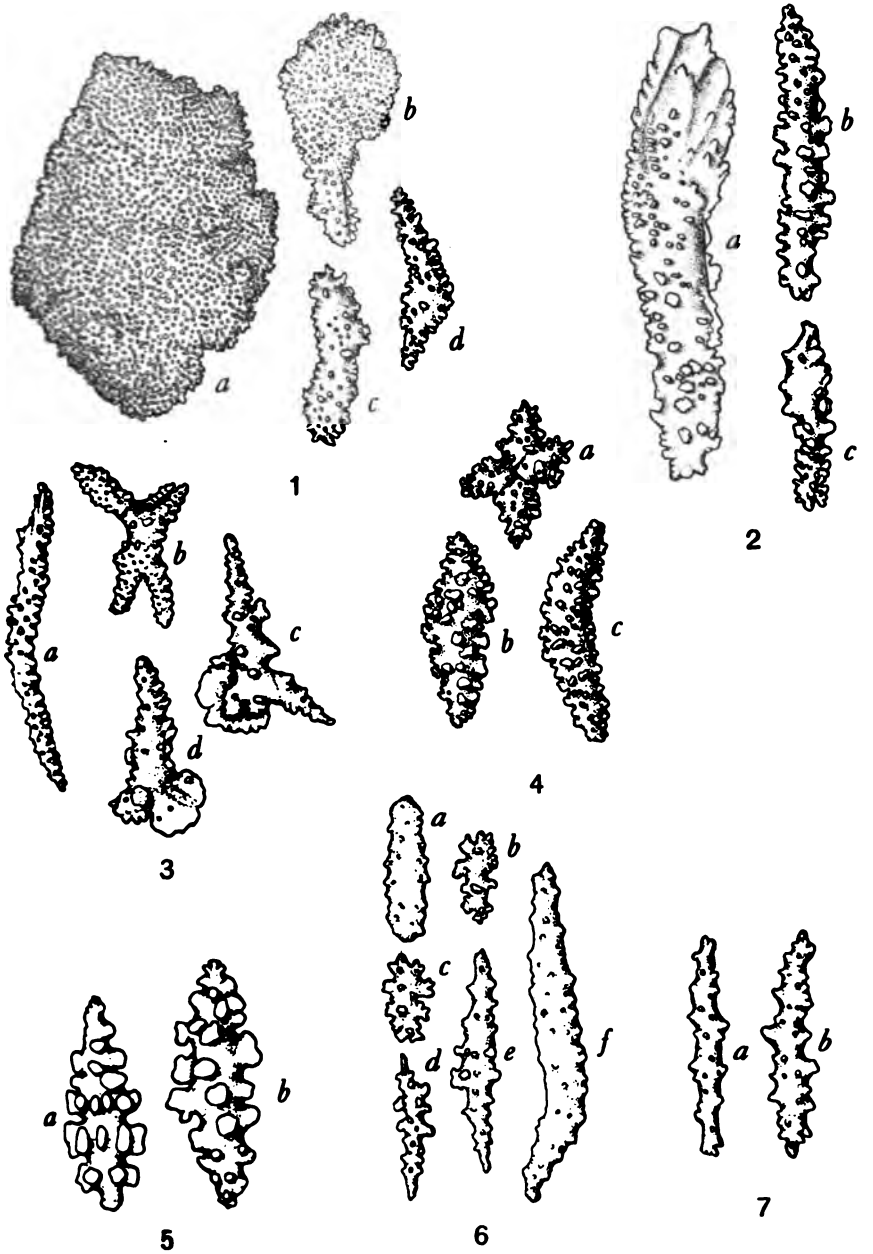

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[SCIENTIFIC RESULTS OF THE PHILIPPINE CRUISE OF THE FISHERIES STEAMER "ALBATROSS," 1907–1910.—No. 21.]

DESCRIPTIONS OF A NEW FAMILY, TWO NEW GENERA, AND TWENTY-NINE NEW SPECIES OF ANACANTHINE FISHES FROM THE PHILIPPINE ISLANDS AND CONTIGUOUS WATERS.

By LEWIS RADCLIFFE,[1]

Scientific Assistant, United States Bureau of Fisheries.

In the present paper there are described the new fishes of the order Anacanthini obtained on the Philippine cruise of the fisheries steamer *Albatross*. The families represented are the Gadidæ, Macrouridæ, Macrouroididæ (new), and Ateleopodidæ, the last being placed provisionally in this order.

Family GADIDÆ.

Genus PHYSICULUS Kaup.

PHYSICULUS NIGRESCENS Smith and Radcliffe, new species.

Plate 22, fig. 1.

Dorsal 8–66; anal 72; ventrals 6; pectorals 23; scales about 9+25–100.

Head 4.12 (4.56 in total length), depressed, as broad as deep, broadly rounded from shoulders to snout; body compressed, tapering rapidly posteriorly to a very narrow peduncle, greatest depth 5.15 (5.70 in total length); eye rather small, subcircular, 4.80 in head, 1.44 in snout, 1.52 in interorbital; snout 3.33, broad, blunt, and rounded at the end; mouth large, oblique, lower jaw included; maxillary 2.06, barely reaching vertical from posterior margin of orbit; bands of villiform teeth on jaws; vomer and palate edentulous; interorbital 3.43, broad and flat; nostrils small, close together, immediately in front of eyes; barbel small, about five-twelfths diameter of eye; pseudobranchiæ absent; gill-rakers on first arch short, 3+13; vent situated at one-third of the distance from origin of anal to base of ventrals; scales small, covering head and body, lateral line arched anteriorly.

[1] In the study of this collection the writer has had the assistance of Dr. Hugh M. Smith, who assumes joint authority for the new forms described.

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Anterior dorsal low, longest ray a little longer than snout; second dorsal close to first, lower in the middle, the longest rays being near the caudal, tips of posterior rays reaching base of caudal; caudal long, narrow, posterior margin rounded; anal similar to second dorsal, its distance from tip of snout slightly less than one-third the distance from base of caudal; ventrals 1.30 in head, small, far apart, tip of longest ray reaching base of seventh anal ray; pectorals 1.43 in head, as long as part of head behind anterior margin of pupil.

Color in alcohol: Ground color brownish black with silvery reflections, lightest on top of head and sides of body posteriorly, darkest on belly, the latter has a bluish cast and metallic reflections; vertical fins dusky, margins and basal portions somewhat darker; paired fins buff, their axils black; peritoneum and an area on posterior part of gill chamber silvery white.

Type.—Cat. No. 72923, U.S.N.M., 27.4 cm. in length, taken with a beam trawl at station 5296 (lat. 13° 40′ 09″ N.; long. 120° 57′ 45″ E.), in Verde Island Passage, at a depth of 210 fathoms, on a bottom of mud and sand.

From our examples of *P. japonicus* Hilgendorf, which agree with an example from Kagoshima, Japan, identified by Smith and Pope, *P. nigrescens* appears to be distinct, separable on the greater number of rays in the anal (66 to 72 in *nigrescens*, 58 to 65 in *japonicus*), much lower first dorsal, longer pectorals and ventrals, smaller barbel, smaller eye, longer snout, broader interorbital, and darker coloration. From Hilgendorf's meager description of the type of *japonicus* it differs in having the head longer, the interorbital broader, the first dorsal shorter, and the anal longer. *P. edelmanni* Brauer is very similar in form but has a shorter head, no barbel, only 5 ventral rays, 20 pectoral rays, and is of lighter coloration.

Family MACROURIDÆ.

Subfamily BATHYGADINÆ.

Our observations do not agree with those of Mr. Regan [1] as to the position of the coracoid foramen in *Gadomus* and *Melanobranchus*. In one of the types of *G. longifilis* (Goode and Bean) and in our examples of *G. multifilis* (Gunther) [2] from the Philippines the coracoid foramen is not within the substance of the hypercoracoid, but between the hypercoracoid and hypocoracoid as in the gadoids. From the foramen a shallow but distinct fossa extends obliquely toward center of each coracoid bone, its breadth and depth decreasing posteriorly. In some individuals more of the foramen lies within the hypercora-

[1] Regan, Ann. Mag. Nat. Hist., ser. 7, vol. 11, 1903, No. 65, p. 459, fig. 24.

[2] We consider these species distinct, separable on the smaller number of pectoral rays in the former. *B. furvescens* Alcock is also distinct, belonging to the genus *Repanis* Jordan.

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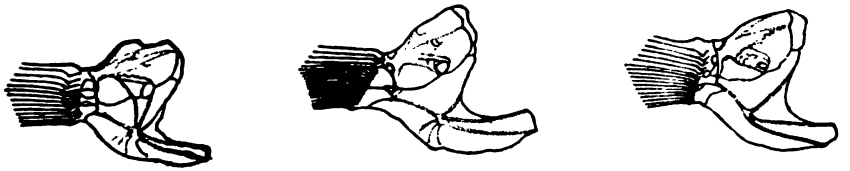
coid than within the hypocoracoid, careful dissection being necessary to show its true position. In *Melanobranchus antrodes* Jordan and Gilbert the foramen lies on the edge of the hypercoracoid, and does not encroach on the substance of the hypocoracoid; there is a shallow fossa leading from the foramen in the former bone but none in the



Gadomus multifilis. *Melanobranchus antrodes.* *Regania sulcata.*

FIG. 1—POSITION OF CORACOID FORAMEN IN CERTAIN MACROURIDS.

latter. In the species of *Regania* examined the foramen lies within the substance of the hypercoracoid, close to or at some distance from the suture between the coracoid bones; the portion above and behind the aperture is somewhat thinner, but does not form as distinct a fossa as in other forms.

Genus REGANIA Jordan.

REGANIA FILAMENTOSA Smith and Radcliffe, new species.

Plate 22, fig. 2.

Dorsal II,10–107; anal 90; ventrals 8; pectorals 14.

Head 5.34 in total length, broad, depressed anteriorly, cavernous, greatest breadth slightly exceeding length of snout plus eye; body slender, tapering, greatest depth 7.58 in total length; length of head and trunk 3.36; vent close to origin of anal; tail slender, compressed; eye 4.30 in head, 1.34 in snout, 1.52 in interorbital, small; interorbital 2.81, broad, flattened, with a low central depression; snout 3.22, broad, blunt, depressed, with a low median ridge; nostrils close to eye, the anterior small, circular, the posterior large, slit-like; mouth large, terminal, slightly oblique; maxillary 1.61, extending beyond vertical from hinder margin of eye for one-half an eye diameter; mandible included, shutting within premaxillary band of teeth; mandibular barbel absent; narrow bands of small, slightly depressible teeth in jaws; vomer and palatines toothless; opercle terminating in a slender spine; gills 4, a small slit behind the fourth; outer set of gill-rakers long and slender, 5+20; pseudobranchiæ absent; coracoid foramen small, situated at some distance from the edge of the hypercoracoid, a shallow fossa extending backward from its aperture toward center of bone; scales small, deciduous, unarmed, concentric striæ well developed, lateral line arched anteriorly, becoming median posteriorly.

Origin of dorsal over base of pectorals; first spine small, concealed second elongate, filiform, 2.70 in total length; rays of first dorsal

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forked and articulated; interval between dorsals scarcely wider than space separating successive rays; anterior rays of second dorsal much higher than those of anal, longest 2.81 in head; outer ventral ray elongate, filiform, 2.70 in total length; second pectoral ray elongate, filiform, as long as longest ventral ray; base of ventrals midway between tip of mandible and vent.

Color in alcohol: Ground color wood-brown; top of head light gray; inside of opercle and mouth, and under side of head blackish, with silvery reflections; vertical fins dusky gray; paired fins somewhat darker.

Type.—Cat. No. 72924, U.S.N.M., 24.2 cm. in length, taken with a beam trawl at station 5587 (lat. 4° 10′ 35″ N.; long. 118° 37′ 12″ E.), near Sipadan Island, west coast of Borneo, at a depth of 415 fathoms, on a bottom of green mud, sand, and coral.

This species resembles *Melanobranchus micronemus* Gilbert from the Hawaiian Islands in form, but differs in having the interorbital much broader, 1.5 times width of eye, fewer pectoral rays, coracoid foramen within the substance of the hypercoracoid, and no mandibular barbel. There are 3 examples of this species in the collection, the second a cotype, and the third from station 5650, taken at a depth of 540 fathoms.

REGANIA SULCATA Smith and Radcliffe, new species.

Plate 22, fig. 3.

Dorsal II,10–105; anal 88; ventrals 9; pectorals 16.

Head 4.85 in total length, cavernous, mucous canals large, membranous covering thin, dorsal surface with a higher arch than in *R. nipponica* Jordan and Gilbert from Japan, greatest width equal to length of snout plus eye; body stout, greatest depth at origin of dorsal 6.60 in total length; length of head and trunk 2.84; vent separated from origin of anal by a distance equal to diameter of pupil; tail tapering, compressed; eye 3.96, large, subelliptical; interorbital 4.77 in head, 1.20 in eye, flattened; snout about as long as eye, depressed, blunt, with a conspicuous knob at tip; nostrils close to eye, the anterior small, circular, the posterior large, elliptical; mouth large, terminal, slightly oblique; maxillary 1.82, truncate at tip, extending slightly beyond vertical from hinder margin of eye; mandible pointed, shutting entirely within premaxillary band of teeth; mandibular barbel rudimentary, represented by a slight knob; narrow bands of small depressible teeth in jaws, a toothless space at symphysis of upper jaw equal in width to 0.75 diameter of pupil; palate toothless; opercle armed with two sharp, slender spines, the first above, the second below, base of pectoral, the latter not reaching edge of opercle; gills 4, a long slit behind the fourth; outer set of gill-rakers long and slender, 5+16; pseudobranchiæ absent; corcacoid foramen small,

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situated near the edge of the hypercoracoid, a shallow fossa extending backward toward center of bone; scales small, deciduous, unarmed, striæ well developed; 9 scales from last dorsal ray to and including lateral line; lateral line arched anteriorly, becoming median at a distance from tip of opercle equal to length of head.

First dorsal spine small, concealed, above base of pectoral, second about 0.33 length of head, rays of first dorsal forked at tip and articulated; interval between dorsals scarcely greater than space separating successive rays; second dorsal rays much better developed than those of anal; base of ventrals an eye diameter nearer origin of anal than tip of snout, outer ventral ray 1.72, slightly longer than remaining rays; pectoral about 1.33.

Color in alcohol: Ground color chocolate; scales, top and sides of head grayish; edges of jaws and opercle, inside of opercle and mouth, and fins brownish black.

Type.—Cat. No. 72925, U.S.N.M., 44 cm. in length, taken with a beam trawl at station 5423 (lat. 9° 38′ 30″ N.; long. 121° 11′ 00″ E.), near Cagayan Island, Jolo Sea, at a depth of 508 fathoms, on a bottom of gray mud and coral sand.

This species resembles *R. nipponica* Jordan and Gilbert, from Japan. In the Philippine form the interorbital is much narrower, being less than or equal to horizontal diameter of eye, and the eye is larger, less than 0.25 length of head. Our specimens were taken at depths of 182 to 508 fathoms.

Subfamily MACROURINÆ.

Genus HYMENOCEPHALUS Giglioli.

HYMENOCEPHALUS LONGIPES Smith and Radcliffe, new species.

Plate 23, fig. 1.

Dorsal II,10–100; anal 101; ventrals 8; pectorals 15.

Head 5.65 in total length, pointed, elongate, slightly resembling that of *H. longibarbis* (Günther), crests and membranes roofing the canals firmer than in related species, middle length of head at posterior margin of pupil, breadth of head 1.88 in its length; body arched, greatest depth, at origin of first dorsal, 7 in total length; tail long, tapering; eye 2.95, subcircular, orbital rims not as markedly expanded as in related species; interorbital 5, narrow, rugose; snout 3.69, nearly as long as eye, rather pointed; nostrils close to eye, a narrow membranous strip of skin separating the two apertures; suborbital very narrow, its width less than diameter of pupil; mouth large, slightly oblique, lower jaw included; maxillary 1.68, extending slightly beyond vertical from posterior margin of eye; mandibular barbel absent; teeth in jaws small, villiform, in narrow bands; gill membranes forming a free fold across the isthmus; no traces of pseu-

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dobranchiæ discernible; scales large, 3 rows from last dorsal ray to and including lateral line, exposed portion of each scale armed with small slightly procumbent spinules, these quite regular in their arrangement; region below and behind pectoral base naked, belly scaled; a triangular area, with well-marked striæ, its apex below base of pectorals, extending down to and including base of ventrals.

Tip of snout to origin of dorsal 5.15 in total length; first dorsal spine minute, second 1.20 in head, longer than adjacent soft rays; interdorsal space 7.61 in total length; second dorsal low; tip of tail broken, provided with five rays; tip of snout to origin of anal 3.50; tip of snout to origin of ventrals 5.22, the outer ventral rays greatly produced, the longest 3.57 in total length; pectoral 1.55 in head.

Color in alcohol: Ground color, brownish buff, minutely dotted with darker brown; an indistinct silvery band along middle of side; snout, inside of mouth, angle of mouth, and a narrow line along mandible whitish; cheek and preopercle silvery; opercle posteriorly blackish, margin lighter; front margin of first dorsal blackish; second dorsal and anal whitish, each ray with a distinct black dot at base; distal half of ventral rays, with the exception of the two inner rays, black, rest of fin whitish, base black; pectorals white, black dots on upper axil; region around vent blackish, area in front of this silvery.

Type.—Cat. No. 72926, U.S.N.M., 17.5 cm. in length, taken with a beam trawl at station 5421 (lat. 10° 33′ 30″ N.; long. 122° 26′ 00″ E.), between Panay and Guymaras at a depth of 137 fathoms, on a bottom of green mud.

This species differs from other described forms not provided with a mandibular barbel in the elongate snout and produced ventral rays.

HYMENOCEPHALUS TORVUS Smith and Radcliffe, new species.

Plate 23, fig. 2.

Dorsal II,8–102; anal 97; ventrals 7; pectorals 14.

Head 5.81 in total length, closely resembling our examples of *H. striatissimus* Jordan and Gilbert; as in that species the crests are all very thin and papery and the membranes roofing the canals very delicate and easily ruptured; the middle length of head lies immediately behind posterior margin of pupil; body not strongly arched, depth 7.12 in total length; tail tapering abruptly, slender, elongate; eye 2.75, large, circular, orbital rims greatly expanded; interorbital 2.90, much broader than in *H. longipes;* snout 4.23, short, blunt, median ridge not greatly projecting above level of interorbital space; nostrils close to eye as in related species; suborbital broader than in *H. longipes,* breadth at narrowest point about equal to diameter of pupil; mouth moderate, slightly oblique, lower jaw included; maxillary 1.83, barely reaching vertical from posterior margin of eye;

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mandibular barbel present, small, as long as diameter of pupil; narrow villiform bands of teeth in jaws; gill membranes forming a free fold across the isthmus; no traces of pseudobranchiæ discernible; scales small, deciduous, 6 rows from last dorsal ray to and including lateral line; lateral line arched anteriorly; striated area above ventral base extending upward nearly to base of pectorals.

Tip of snout to origin of dorsal 5.32 in total length; first dorsal spine minute, second dorsal spine 1.15 in head, longer than adjacent soft rays; interdorsal space 6.72 in total length; second dorsal low; tip of snout to origin of anal 3.47; anal rays longer than soft dorsal rays; tip of snout to origin of ventral 5.50; outer ventral ray with a filamentous tip, 1.25 in head; pectoral 1.37.

Color in alcohol: Ground color, brownish buff, sides minutely dotted with darker brown; traces of a silvery band along middle of side; belly and under side of head blackish with metallic glints; snout, angle of mouth, and narrow line along mandible whitish; cheek and preopercle silvery; suborbital silvery, with darker shades underneath; opercle blackish, with silvery glints; insertion of dorsal and second spine blackish, distal half of soft rays dusky, basal half whitish; each ray of second dorsal and anal with a black spot at base; first anal ray blackish; ventrals and pectorals dusky black, their bases black.

Type.—Cat. No. 72927, U.S.N.M., 16 cm. in length, taken with a beam trawl at station 5548 (lat. 6° 00′ 20″ N.; long. 120° 45′ 35″ E.), near Jolo, at a depth of 232 fathoms, on a bottom of sand and broken shells.

This species is very close to Philippine examples of *H. striatissimus*, differing in having 7 (rarely 6) instead of 8 (rarely 9) ventral rays and in its darker coloration. These characters appear to be constant for the entire series of specimens in the collection.

HYMENOCEPHALUS LONGICEPS Smith and Radcliffe, new species.

Plate 23, fig. 3.

Dorsal II,10–138; anal 135; ventrals 8; pectorals 15.

Head 5.27 in total length, low, pointed, elongate, resembling *H. longibarbis;* crests firmer than in *H. torvus*, and membranes lining the canals less easily ruptured; middle length of head slightly in front of posterior margin of orbit, breadth of head 1.86 in its length; depth of body 7.71 in total length, back moderately arched, greatest depth being at origin of first dorsal; tail slender, elongate; eye 3.28, subcircular, orbital rims not as prominent as in *H. torvus;* interorbital 5.86, very narrow; snout 4.10, longer than in any of the other Philippine species, pointed, scarcely protruding beyond tip of premaxillary; nostrils as in related species; suborbital very narrow, its width equal to about 0.5 diameter of pupil; mouth large, oblique, lower jaw

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included; maxillary 1.78, extending beyond vertical from posterior margin of eye for a distance equal to about one-half diameter of pupil; mandibular barbel 2.15 in head, very long and slender; teeth small, villiform in narrow bands, a toothless space at tip of upper jaw about 0.4 of diameter of pupil in width; gill membranes forming a free fold across the isthmus; no traces of pseudobranchiæ discernible; scales large, deciduous, 5 rows from last dorsal ray to and including lateral line; middle of belly between vent and ventrals naked.

Tip of snout to origin of dorsal 5 in total length; first dorsal spine minute, second 1.37 in head, longer than adjacent soft rays; interdorsal space 6.35 in total length; second dorsal low; tip of snout to origin of anal 3.10, anal rays much better developed than those of second dorsal; tip of snout to origin of ventral 5; outer ventral ray 4.80 in total length, long, filamentous; pectoral 1.71 in head.

Color in alcohol: Ground color, ochraceous-buff; region below middle line of side with silvery reflections; region around and below the first dorsal dusky; snout, angle of mouth, and a narrow line along mandible whitish; roof of mouth, suborbital, cheek and preopercle silvery; opercle, under side of head and body blackish, with silvery reflections; a striated area above ventral base extending backward on median line of belly to vent; vertical fins brownish; a black spot at base of each ray of second dorsal and anal; paired fins dusky, black at base.

Type.—Cat. No. 72928, U.S.N.M., 21.6 cm. in length, taken with a beam trawl at station 5459 (lat. 13° 10′ 21″ N.; long. 123° 59′ 54″ E.), off southeastern Luzon, at a depth of 201 fathoms.

This species resembles *H. longibarbis* Günther, and may prove to be identical with it. In the Philippine species the snout and maxillary are longer and the eye smaller than in Günther's figure, and there are more dorsal and pectoral rays. It differs from *H. longipes* in having a well developed barbel, longer snout, slightly narrower interorbital, more rays in the second dorsal and anal, and the rays adjacent to outer ventral ray shorter.

Genus MACROURUS Bloch.

Some of the species included in the present genus possess characters showing relationship to the genus *Coryphænoides*, but the intergradation of characters among the species is so gradual that we have failed to discover any satisfactory line of separation. The contention of Garman[1] that the generic term *Coryphænoides* based on *C. rupestris* of Gunner (1765) should supersede *Macrourus* of Bloch (1787) seems well founded. The retention of the generic name *Macrourus* is provisional.

[1] Garman, Deep-Sea Fishes, 1899, p. 194.

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MACROURUS LUCIFER Smith and Radcliffe, new species.

Plate 24, fig. 1.

Dorsal II,11–140; anal about 175; ventrals 7; pectorals 18.

Head 6.50 in total length, 1.25 in distance from tip of snout to anal fin, short, compressed, blunt anteriorly, its greatest depth nearly equaling its length, breadth 1.78 in its length; region over anterior part of eye slightly concave, strongly arched posteriorly; body deep, compressed, region in front of dorsal strongly arched, greatest depth at origin of dorsal, 6 in total length; vent slightly nearer first anal ray than insertion of ventrals; tail long, slender, tapering posteriorly; eye 2.91 in head, circular, longer than snout; interorbital 2.58, slightly convex, wider than eye; snout 3.53, short, blunt, evenly rounded, slightly projecting beyond mouth; supranarial and suborbital ridges very inconspicuous; anterior nostril circular, with slightly raised margin, posterior slit-like; mouth moderate, as broad as long; maxillary 2.58, reaching vertical from middle of pupil; teeth small, subconical, not very closely set, outer row in upper jaw scarcely enlarged; barbel short, rather stout, equal to diameter of pupil; scales small, about 14 from origin of dorsal to and including lateral line, 10 from last dorsal ray to and including lateral line, exposed portion of each scale armed with many small, slender, hair-like prickles; a conspicuous pearly, lens-like body, about .75 pupil, embedded on the ventral surface between base of ventrals.

Tip of snout to origin of dorsal 5.41 in total length; first dorsal spine minute, second dorsal spine 1.34, curved, armed, except for a short distance at base, with many small, pointed, spinules; longest dorsal ray 1.26; interdorsal space 2.40; rays of second dorsal inconspicuous anteriorly, more distinct posteriorly; anal better developed, its origin under base of first ray of first dorsal; ventrals 3.04, small, tips reaching beyond insertion of anal; pectoral 1.42.

Color in alcohol: Back fawn-color; sides wood-brown; dorsal dusky, a large black spot on distal margin; second dorsal and anal cream anteriorly, distal 0.4 blackish; ventrals, region around luminous organ and vent, blackish; pectorals dusky.

Type.—Cat. No. 72929, U.S.N.M., 21.7 cm. in length, taken with a beam trawl at station 5516 (lat. 8° 46′ 00″ N.; long. 123° 32′ 30″ E.), near Point Tagolo, Mindanao, at a depth of 175 fathoms, on a bottom of globigerina ooze.

Eight examples were taken at station 5519 at a depth of 182 fathoms.

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MACROURUS NIGROMARGINATUS Smith and Radcliffe, new species.

Plate 24, fig. 2.

Dorsal II,10–(about)110; anal about 100; ventrals 10; pectorals 20.

Head 5.64 in total length, 1.40 in distance from tip of snout to anal fin, rather blunt anteriorly, compressed, breadth about 0.5 its length, bones rather firm, ridges inconspicuous; body arched, compressed, greatest depth at origin of dorsal 6.20 in total length; vent just behind base of ventrals; tail short, tapering; eye 3.08 in head, subcircular, longer than snout; interorbital 4, flattened; snout 3.64, short, blunt, rounded, projecting but little beyond mouth, its height at tip about 0.8 diameter of eye; mouth of moderate size; maxillary 2.67, reaching vertical from middle of eye; teeth of moderate size, subconical, outer row in upper jaw enlarged; barbel stout, 0.8 diameter of eye in length; scales small, about 12 from origin of dorsal to and including lateral line, exposed portion of each scale armed with long, slender spinules, normally arranged in about 6 to 8 nearly parallel rows; spinules larger, in smaller number, and more regular in their arrangement than in *M. macronemus;* lateral line prominent, arched anteriorly, becoming median above tenth anal ray.

Tip of snout to origin of dorsal, 5.15 in total length; second dorsal spine as long as head, armed with about 15 spinules; interdorsal space 1.45 in head; origin of anal behind base of first dorsal, its anterior rays as long as eye, much better developed than those of second dorsal; outer ventral ray 1.68 in head, not greatly produced beyond adjacent rays; pectoral 1.60.

Color in alcohol: Ground color light clay; region below pectorals blackish underneath; scales of this region smoke-gray; dorsal spines and anterior rays dusky black, posterior rays straw-colored; anal straw-colored; distal half of first 7 rays black, tips of anterior ventral rays blackish, remaining rays dusky; pectoral dusky, axil blackish.

Type.—Cat. No. 72930, U.S.N.M., 18 cm. in length, taken with a beam trawl at station 5569 (lat. 5° 33′ 15″ N.; long. 120° 15′ 30″ E.), near Simaluc Island, at a depth of 303 fathoms, on a bottom of coral sand.

Among the examples of this small species are several females with well-developed eggs. The black markings on dorsal, anal, and ventrals are distinctive, and in some examples are much more distinct than in the type.

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MACROURUS MACRONEMUS Smith and Radcliffe, new species.

Plate 24, fig. 3.

First dorsal II,8; ventrals 9–11; pectorals 21.

Head 6.83 in total length, 1.36 in distance from tip of snout to anal fin, rather blunt anteriorly, deeper than broad, breadth about 0.5 its length, dorsal profile relatively straight, ascending to base of dorsal; body somewhat arched, compressed, greatest depth at origin of dorsal; 7.80 in total length; vent just behind base of ventrals; tail long, slender, thread-like; eye 3.33 in head, circular, longer than snout; interorbital 4, nearly flat; snout 3.85, short, blunt, without prominent tubercles, projecting but little beyond mouth, its height at tip about 0.75 diameter of eye; nostrils close to eye, anterior circular, posterior slit-like, nearly as long as pupil; mouth well developed, lips thick, fleshy; maxillary 2.63, reaching vertical to posterior margin of pupil; teeth rather large, outer row in upper jaw considerably enlarged, teeth in lower jaw well developed, narrowing posteriorly to a single row; barbel distinct, about 0.6 diameter of eye in length; scales small, about 13 from origin of dorsal to and including lateral line, exposed portion of each scale densely packed with long, stout spinules, some of which extend beyond free margin of scales; lateral line conspicuous, arched anteriorly.

Tip of snout to origin of dorsal 5.61 in total length; first dorsal spine small, second nearly as long as head, armed with small, widely set spinules; interdorsal space 3.12 in head; origin of anal behind first dorsal, its rays better developed than those of the second dorsal; outer ventral ray long, filamentous, about 0.14 total length, 9 ventral rays on left side, 11 on the right side; pectoral 1.72 in head.

Color in alcohol: Ground color walnut brown, scales smoke gray; region below pectorals slightly darker than rest of body; branchiostegal membranes blackish; vertical fins dusky black, paired fins very dark.

Type.—Cat. No. 72931, U.S.N.M., 34.3 cm. in length, taken with a beam trawl at station 5424 (lat. 9° 37′ 05″ N.; long. 121° 12′ 37″ E.), near Cagayan Island, Jolo Sea, at a depth of 340 fathoms, on a bottom of coral sand.

MACROURUS PARADOXUS Smith and Radcliffe, new species.

Plate 25, fig. 1.

Dorsal II,9–100; anal 105; ventrals 9; pectorals 19 and 21.

Head 5.10 in total length, large, deeper than broad, its breadth 1.80 in its length; depth of body 5.78, back slightly arched, greatest depth being at origin of dorsal; vent immediately in front of anal; tail rapidly tapering, elongate; eye 4.60 in head, 1.12 in snout; interorbital 3.98, its breadth greater than horizontal diameter of eye,

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flat; snout 4.12, blunt at tip, not projecting beyond tip of upper jaw, its height at this point above premaxillary about 0.5 its length, a small protruding tubercle at its extreme tip, traces of lateral tubercles; nostrils close to eye, anterior circular, posterior slit-like; suborbital about 0.75 diameter of eye in width; median ridge indistinct, not reaching angle of preopercle; mouth large, slightly oblique, tip of lower jaw included; maxillary 2.35, barely reaching vertical to posterior margin of pupil; mandibular barbel large, equal to diameter of eye in length; upper jaw with an outer row of small canine-like teeth and an inner villiform band of small teeth, a single row of small canines and an outer series of smaller irregularly set teeth on mandible, mandibular teeth smaller, in about three series in front of mouth, narrowing to a single row posteriorly, bearing a strong resemblance to the arrangement found in species of *Chalinura*, no teeth on vomer or palatines; gill membranes attached to isthmus; opening of last gill-slit small; scales large, distinct, 9 rows from insertion of dorsal to and including lateral line, 7 rows from last ray of first dorsal, 34 between middle of dorsal and vent; free portion of each scale armed with well-developed spinules irregularly arranged; spinules on the scales of head arranged more regularly in about 12 radiating lines.

Tip of snout to origin of dorsal 4.30 in total length; first dorsal spine small, second 1.80 in head, basal portion smooth, small spinules on distal portion; rays of second dorsal anteriorly small, not connected with one another by membrane, gradually growing longer to middle of fin, then gradually becoming shorter, longest ray about 0.4 diameter of eye; tip of snout to origin of anal 3.50 in total length; anal rays much better developed than those of second dorsal; tip of snout to origin of ventrals 4.40 in total length; outer ventral ray 1.77 in head, filamentous at tip; pectoral 1.77.

Color in alcohol: Ground color, hair brown; fins seal-brown, posterior dorsal and anal rays much faded; free opercular membrane, margin of lips, membrane connecting nostrils, and peritoneum dark seal-brown.

Type.—Cat. No. 72932, U.S.N.M., 58.5 cm. in length, taken with beam trawl at station 5428 (lat. 9° 13′ 00″ N.; long. 118° 51′ 15″ E.), off eastern Palawan, at a depth of 1,105 fathoms, on a bottom of gray mud.

MACROURUS MICROPS Smith and Radcliffe, new species.

Plate 25, fig. 2.

Dorsal II,9–51; anal 70; ventrals 7; pectorals 19.

Head 5.12 in total length, long, pointed, compressed, its breadth less than 0.5 its length; dorsal profile from tip of snout to origin of dorsal nearly straight; body deep, compressed, greatest depth at origin of dorsal 5.18 in total length; vent close to origin of anal; tail

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short, deep, compressed; eye 6.10 in head, 1.74 in snout, 1.23 in interorbital, small, subcircular; interorbital 4.94, convex; snout 3.50, rather blunt, projecting but little beyond mouth, terminal tubercles and suborbital ridge inconspicuous; mouth relatively large; lips fleshy; maxillary 3.23, barely reaching vertical to anterior margin of pupil; teeth long, slender, incurved, outer row of premaxillary teeth but little enlarged; scales large, 9 in a series from origin of dorsal to and including lateral line, 8 from last dorsal ray, exposed portion of each scale armed with rather weak recumbent spinules arranged in about 13 to 18 parallel series; lateral line conspicuous, not strongly arched anteriorly.

Tip of snout to origin of dorsal 4.22 in total length; first dorsal spine small, second long, whip-like, 2.30 in total length, traces of a few small spinules on anterior margin near base; interdorsal space about 0.18 length of head, less than base of first dorsal; anterior rays of second dorsal small, rather widely separated, not connected by membrane; rays posteriorly better developed; origin of anal behind origin of second dorsal, its distance from tip of snout 2.78 in total length, rays well developed; outer ventral ray 1.79 in head, not greatly produced, its tip not reaching origin of anal, base under origin of first dorsal; pectoral 1.42, its base a little in advance of vertical from origin of first dorsal.

Color in alcohol: Ground color, sepia, scales with a grayish cast; fins dark seal-brown.

Type.—Cat. No. 72933, U.S.N.M., 43 cm. in length, taken with a beam trawl at station 5470 (lat. 13° 37′ 30″ N.; long. 123° 41′ 9″ E.), near Atulayan Island, east coast of Luzon, at a depth of 560 fathoms, on a bottom of mud.

In addition to the type, the collection contains 4 examples, 11.4 to 18.3 cm. in length, from station 5325, off northern Luzon. From our examples of *M. macrolophus* Alcock, which it closely resembles, it differs in the much smaller size of the eye and in the number of ventral rays, 7 in *microps*, 8 in *macrolophus;* these characters are constant.

MACROURUS DUBIUS Smith and Radcliffe, new species.

Plate 25, fig. 3.

Dorsal II,9–73; anal 90; ventrals 8; pectorals 21.

Head 4.48 in total length, long, pointed, slightly depressed dorsally, its breadth 1.97 in its length, slightly greater than depth at middle of eye; bones firm, suborbital ridge distinct, the slope from ridge to mouth scarcely steeper than from ridge to eye, terminal tubercles on snout rather prominent; body slender, not strongly compressed, greatest depth at origin of dorsal 6.04 in total length, vent close to origin of anal; eye 5.30 in head, 1.50 in snout, 1.10 in interorbital, small, subcircular; interorbital 4.75, flat; rest of upper profile of head

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convex, the flattened area forming a slight concavity in dorsal contour line; snout 3.52, rather blunt, projecting slightly beyond anterior margin of mouth; mouth large, gape barely reaching anterior margin of eye; barbel stout, five-ninths as long as eye; maxillary 2.97, nearly reaching vertical from middle of eye; teeth small, cardiform, incurved, subequal; scales heavy, regular in their arrangement, 8 in a series from second dorsal spine to and including lateral line, 6 from last dorsal ray; exposed portion of each scale armed with a mass of densely packed recumbent spinules, more or less regularly arranged in V-shaped rows, their apices pointing forward and lying in the median horizontal line of scale; spinules somewhat flattened, some of them, especially those near outer edge of scales, lanceolate, strengthened by a longitudinal keel, similar to that described for *M. nasutus* (Günther); spinules on scales of head not as erect as commonly found in *Macrourus;* head scaled.

Tip of snout to origin of dorsal 3.82 in total length; first dorsal spine small; second long, slender, 1.46 in head, armed with small spinules; interdorsal space 1.38 in eye; anterior rays of second dorsal rudimentary, posterior rays becoming well developed; origin of anal under base of fifth rudimentary dorsal ray; origin of ventral in vertical to first dorsal spine, slightly behind base of pectoral; outer ventral ray long, filamentous, 1.46 in head, reaching to base of sixth anal ray; pectoral 1.70.

Color in alcohol: Hair-brown, fins blackish.

Type.—Cat. No. 72934, U.S.N.M., 42.5 cm. in length, taken with a beam trawl at station 5511 (lat. 8° 15′ 20″ N.; long. 123° 57′ 00″ E.), Iligan Bay, Mindanao, at a depth of 410 fathoms, on a bottom of gray mud and fine sand.

This species resembles *M. nasutus* (Günther); it has a longer head and snout, smaller eye, 8 ventral rays instead of 10, a much shorter interdorsal space, and outer ventral ray reaching beyond base of anal.

M. wood-masoni Alcock, which resembles this species, has a slightly larger eye and shorter snout, fewer scales between last ray of dorsal fin and lateral line, a longer interdorsal space, and shorter outer ventral ray.

MACROURUS ASPRELLUS Smith and Radcliffe, new species.

Plate 26, fig. 1.

Dorsal II,9–71; anal 70; ventrals 8 (?); pectorals 20.

Head 4.60 in total length (tail mutilated), its dorsal surface broad and flat, subrectangular in transverse section, its breadth 2.04 in its length, less than its depth at middle of eye; bones not very firm, suborbital ridge less distinct than in *M. dubius,* terminal tubercles on snout less prominent; body compressed, greatest depth at origin of

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dorsal 5.58 in total length; vent close to origin of anal; eye 4.18 in head, 1.16 in snout, large; interorbital 3.60, equal to length of snout, broad, flat, depressed; snout blunt, overhanging mouth for a distance about 0.33 diameter of eye; mouth large, maxillary 3, barely reaching vertical to middle of eye; teeth long, slender, cardiform, those in outer row of upper jaw slightly enlarged; scales large, regular, somewhat deciduous, very rough, 6 in a series from second dorsal spine to and including lateral line, 5 from last dorsal ray; exposed portion of each scale armed with about 13 subparallel rows of rather strong spinules, those in median row slightly larger than the others; spinules of scales of head more nearly erect, the rows on some of the scales somewhat divergent; lateral line distinct, with a long, low arch anteriorly.

Tip of snout to origin of dorsal 4.05 in total length, first dorsal spine 0.28 as long as eye, second longer than head, 4.35 in total length, armed with rather close-set spinules; interdorsal space nearly equal to diameter of eye, 0.2 length of head; ventrals lost, pectorals broken.

Color in alcohol: Hair brown; fins dusky black; scattered black spots on under side of snout and sides of head.

Type.—Cat. No. 72935, U.S.N.M., 41.3 cm. in length, taken with a beam trawl at station 5632 (lat. 1° 00′ 00″ S.; long. 127° 50′ 00″ E.), southeast of Bachian Island, Dutch East Indies, at a depth of 845 fathoms.

MACROURUS PROXIMUS Smith and Radcliffe, new species.

Plate 26, fig. 2.

Dorsal II,9–103; anal 102; ventrals 9; pectorals 19.

Head 5.18 in total length, 1.56 in distance from tip of snout to anal fin, low, tapering, pointed, subquadrangular in transverse section, without conspicuous ridges on dorsal surface, suborbital ridge prominent; trunk short, slender, greatest depth at origin of dorsal 6.09 in total length; vent nearer base of ventrals than origin of anal; tail long, slender, compressed; eye 3.53 in head, subcircular; interorbital 5.12, slightly convex, narrower than eye; snout 3.42, depressed, pointed, without conspicuous tubercles at tip, projecting beyond mouth; region on either side of tip of snout with a slight, semicircular, scaleless groove similar to but not so well developed as in species of *Matæocephalus*, portion of snout lying anterior to this groove apparently capable of slight distension; nostrils close to eye, surrounded by a narrow scaleless area; mouth of moderate size, about as broad as long; maxillary 3, reaching vertical from posterior margin of pupil; teeth small, slender, pointed, outer series in upper jaw very slightly enlarged; barbel small, slender, 0.75 diameter of eye; scales small, 9 in a transverse series from origin of dorsal to and including lateral

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line, 7 from last dorsal ray; exposed portion of each scale densely packed with numerous well-developed spinules, those near distal margin broader, spear-shaped, becoming narrower near center of scale, spinules strengthened by a longitudinal keel, as in *M. nasutus* (Günther); lateral line conspicuous, slightly arched anteriorly; interopercle projecting behind margin of preopercle, its distal margin rounded.

First dorsal spine small, second 1.06 in head, armed with about 24 spinules; interdorsal space 2.82 in head; insertion of anal under middle of interdorsal space, its rays better developed than those of second dorsal; insertion of ventral in advance of first dorsal, outer ray filamentous, 1.76; pectoral, 1.66.

Color in alcohol: Ground color dark clove-brown, darkest on belly, scales with a conspicuous silvery sheen; opercular flap, branchiostegal membranes, and ventrals almost black, other fins dusky.

Type.—Cat. No. 72936, U.S.N.M., 29.2 cm. in length, taken with a beam trawl at station 5202 (lat. 10° 12′ 00″ N.; long. 125° 04′ 10″ E.), in Sogod Bay, Leyte, at a depth of 502 fathoms, on a bottom of gray mud.

This species appears to be very closely related to *M. nasutus* (Günther); the 3 examples in the collection differ from this species in having a comparatively short interdorsal space, vent nearer to base of ventrals than to origin of anal, origin of anal and ventrals more anterior, and 9 ventral rays instead of 10.

MACROURUS ÆQUATORIS Smith and Radcliffe, new species.

Plate 26, fig. 3.

Dorsal II,11–60; anal 70; ventrals 9; pectorals 22.

Head 4.48 in total length, 1.57 in distance from tip of snout to anal fin, nearly as high as wide, broad and rounded forward, flattened on the crown, subquadrangular in transverse section; suborbital ridges and rostral edges moderately prominent; trunk short, compressed, greatest depth at origin of dorsal 5.87 in total length, 2.6 in distance from tip of snout to anal; vent close to origin of anal; tail compressed, rather short (tip slightly mutilated); eye 3.62 in head, circular; interorbital 4.20, flattened, slightly narrower than eye; snout 3.50, evenly rounded at tip, its width across prenareal angles about equal to its length, tip projecting beyond mouth; mouth small, broader than long, not extending backward beyond vertical from middle of eye; maxillary 3.23; teeth small, subconical, in villiform bands, outer row of teeth in the upper jaw considerably longer than the others; barbel moderate, equal to 0.5 diameter of eye; scales large, 6 from origin of dorsal to and including lateral line, each scale armed with rather widely separated spinules, the tips projecting considerably beyond margin of scale, these are arranged in horizontal rows; those project-

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ing beyond margin of scale are somewhat flattened spear-shaped; those on head smaller, standing more nearly at right angles to body.

Tip of snout to origin of dorsal, 3.92 in total length; first dorsal spine small, but distinct, second about 1.40 in head, armed with long slender spinules; interdorsal space about two-ninths as long as head; second dorsal low, feebly developed; anal better developed, its origin from tip of snout 2.85 in total length; ventrals small, outer ray filamentous, as long as head, origin under insertion of first dorsal; pectoral 1.90 in head.

Color in alcohol: Tail and upper part of trunk chocolate, top and sides of head hair-brown, lower sides of head and trunk dark seal-brown, fins dusky.

Type.—Cat. No. 72937, U.S.N.M., 18.8 cm. in length, taken with a beam trawl at station 5608 (lat. 0° 8′ 00″ S.; long. 121° 19′ 00″ E.), Gulf of Tomini, Celebes, at a depth of 1,089 fathoms, on a bottom of gray mud.

This species is close to *M. asper* of Günther, from Japan, differing in the number of pectoral and ventral rays, and character of scales. *M. petersonii* of Alcock appears to be closely related, but differs markedly in shape of snout, size of mouth, length of barbel, and distance between dorsals.

MACROURUS HYOSTOMUS Smith and Radcliffe, new species.

Plate 27, fig. 1.

Dorsal II,9–90; anal 101; ventrals 8; pectorals 18.

Head 4.75 in total length, short, broad, firm, little elevated posteriorly; body slender, little compressed, slightly arched, the greatest depth at origin of dorsal 6.84 in total length; vent slightly nearer insertion of anal than base of inner ventral rays; tail rather stout; eye 4.50 in head, 1.46 in snout, subcircular, nearly as wide as interorbital; interorbital 4.21, broad, flat; snout 3.10, pointed, depressed, its tip above level of middle of eye, and at a distance from mouth slightly greater than diameter of eye; on either side of tip the marginal portion is capable of some distention, on the dorsal surface this portion is set off from the rest of the snout by a semicircular scaleless groove as in species of *Matæocephalus;* nostrils close to eye, the anterior circular, free portion provided with a well-developed flap; suborbital ridge quite distinct; mouth of moderate size, broader than long; lips fleshy; maxillary 3.28; mandibular barbel small, slender, equal to diameter of pupil; teeth cardiform, incurved, outer row in upper jaw slightly enlarged; scales large, 6 in a transverse series from second dorsal spine, 5 in a series from last dorsal ray to and including lateral line; exposed portion of scale armed with long, slender, needle-like spinules, the outer row extending for a considerable dis-

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tance beyond distal margin of scale; under side of head naked; lateral line conspicuous, little arched anteriorly.

Tip of snout to origin of dorsal 4.45 in total length; first dorsal spine small; second 2.33 in total length, long filiform, several small, widely separated spinules on anterior margin of basal portion; posterior margin of free portion with a narrow membranous fringe; interdorsal space slightly less than diameter of eye; anterior rays of second dorsal small but distinct; origin of anal under insertion of second dorsal, its rays somewhat longer than those of the dorsal; outer ventral ray 1.69 in head, tip filamentous, reaching base of sixth anal ray; pectoral 1.73.

Color in alcohol: Dorsal surface mars-brown, somewhat lighter below lateral line; region below pectorals blackish; head anteriorly whitish-gray; branchiostegals, membrane separating nasal apertures, and fins tinged with dark seal-brown.

Type.—Cat. No. 72938, U.S.N.M., 28 cm. in length, taken with a beam trawl at station 5470 (lat. 13° 37′ 30″ N.; long. 123° 41′ 09″ E.), in Lagonoy Gulf, Luzon, at a depth of 560 fathoms, on a bottom of mud.

MACROURUS CAMURUS Smith and Radcliffe, new species.

Plate 27, fig. 2.

First dorsal II,9; ventrals 9; pectorals 22.

Head 5.10 in total length, short, high, compressed, greatest breadth 1.81 in its length, upper profile slightly arched; suborbital ridge sharp, distinct; body rather deep, compressed, greatest depth at origin of dorsal 5.66 in total length; vent immediately in front of anal; tail slender, compressed, tapering; eye 3.33 in head, large, circular, longer than snout; interorbital broad, flat, 3.28 in head, nearly equal to diameter of eye; snout 3.64 in head, short, broad, rather blunt, with a distinct angulation on sides as in species of *Matæocephalus*, but not produced as in species of this genus, almost truncate, with a distinct median tubercle, median ridge on snout quite distinct in the alcoholic specimen; mouth rather large, anterior; maxillary 2.44; mandibular barbel long, slender, as long as eye; teeth small, villiform, in narrow bands, outer row in upper jaw slightly enlarged; scales small, deciduous, apparently about 15 in a series from origin of dorsal to and including lateral line, but the scales are lost, and in this small individual it is impossible to determine accurately the position of the lateral line; exposed portion of each scale armed with about 5 slender, nearly erect spinules, a median row of 3, with a single spinule on each side; under side of head partially scaled.

First dorsal spine small but distinct, second about 0.5 as long as head, with 4 widely separated, distinct spinules; interdorsal space narrow, about 0.66 diameter of eye; rays of second dorsal very small,

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those of anal somewhat longer; outer ventral ray filamentous 2.22 in head; pectoral 2 in head.

Color in alcohol: Sepia, darker on belly, sides, and ventral surface of head; fins dusky.

Type.—Cat. No. 72939, U.S.N.M., 10.2 cm. in length, taken with a beam trawl at station 5428 (lat. 9° 13′ 00″ N.; long. 118° 51′ 15″ E.), off eastern Palawan, at a depth of 1,105 fathoms, on a bottom of gray mud.

MACROURUS ORTHOGRAMMUS Smith and Radcliffe, new species.

Plate 27, fig. 3.

First dorsal II,11; ventrals 10; pectorals 22.

Head 5.12 in total length, arched, depressed anteriorly, breadth 2.18 in length, bones firmer than in *M. parvipes*, which it somewhat resembles; suborbital ridge sharp, wavy; body rather slender, strongly compressed, greatest depth at origin of dorsal 7.20 in total length; vent immediately in front of anal; tail long, slender, compressed; eye 4 in head, subcircular; interorbital 3.30, broader than eye, nearly flat, a slight mesial depression in the alcoholic specimen; snout 3.18, short, depressed, a distinct angulation on sides as in species of *Matæocephalus;* from this point the snout narrows rapidly, the margin being slightly concave in the alcoholic specimen, tip pointed, no well-developed groove along anterior margin such as is found in *Matæocephalus;* mouth rather large; mandibular barbel small; teeth in narrow villiform bands, outer row in upper jaw slightly enlarged; scales of moderate size, 8 in a series from origin of dorsal to and including lateral line, 5 or 6 from last dorsal ray, exposed portion of each scale armed with about 5 parallel rows of slender spinules, these in reduced number, usually a single spine in each outside row, 2 in each of the next and 3 in the median row, those on head erect, hair-like, giving the head a furry appearance; under side of head partially scaled posteriorly.

Tip of snout to origin of dorsal 4.50 in total length; first dorsal spine slender, 0.45 diameter of eye; second spine about 1.67 in head, armed with 6 slender, widely separated spinules; interdorsal narrow, about 0.66 eye; rays of second dorsal low, small; anal rays better developed; outer ventral ray long, filamentous, 1.52 in head; pectoral 1.67.

Color in alcohol: Ground color Vandyke brown; head and belly darker; fins dusky.

Type.—Cat. No. 72940, U.S.N.M., 18 cm. in length, taken with a beam trawl at station 5636 (lat. 1° 55′ 00″ S.; long. 127° 42′ 30″ E.), near Gomomo Island, Dutch East Indies, at a depth of 1,262 fathoms, on a bottom of gray mud and fine sand.

This species was taken with the type of *M. parvipes* and structurally it bears quite a close resemblance; it is readily distinguished

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by the greater number of rays in first dorsal, pectorals, and ventrals, and the armature of the scales.

MACROURUS PARVIPES Smith and Radcliffe, new species.

Plate 28, fig. 1.

First dorsal II,8 (tail mutilated); ventrals 6; pectorals 18.

Head 1.31 in distance from tip of snout to anal, short, slightly arched, not as wide as deep, bony framework not very firm, interosteal tissue badly shrunken in alcoholic specimen; suborbital ridges and rostral edges sharp, prominent; body short, compressed, greatest depth at origin of dorsal 1.80 in distance between tip of snout and origin of anal; vent immediately in front of anal; tail very long, strongly compressed, filamentous in examples in which it is complete; eye 4.08 in head, small, subcircular; interorbital 3, broader than eye, slightly arched; snout 2.75, rather short, depressed, a distinct angulation on sides, as in species of *Matæocephalus;* from point of angulation the snout narrows rapidly, the margin being slightly concave in the alcoholic specimen, tip pointed, the well-developed groove along anterior margin found in species of *Matæocephalus* lacking; mouth rather small, well forward, an eye diameter from tip of snout; maxillary 3.64, scarcely as long as distance between tips of maxillaries posteriorly; teeth small, villiform, in bands, narrowing posteriorly, outer row of teeth in upper jaw scarcely enlarged; barbel minute, scarcely as long as pupil; scales small, 10 from origin of dorsal to and including lateral line, each scale armed with about 15 slender spinules not very regular in their arrangement, spinules of scales of head much larger than those on body; under side of head scaled.

Tip of snout to origin of dorsal 1.17 in distance to anal, first spine small, second 1.30 in head, armed with small, slender spinules; interdorsal space 3 in head; second dorsal low, not as well developed as anal; origin of anal under posterior rays of first dorsal; ventrals small, rays in reduced number, outer ray longest, about 0.33 as long as head; pectorals 2.21 in head, small.

Color in alcohol: Tail and upper part of trunk wood-brown; top and sides of head hair-brown; under side of head and body to twelfth anal ray dark clove-brown; fins dusky.

Type.—Cat. No. 72941, U.S.N.M., 22.8 cm. in length, taken with a beam trawl at station 5636 (lat. 1° 55′ 00″ S.; long. 127° 42′ 30″ E.), near Gomomo Island, Dutch East Indies, at a depth of 1,262 fathoms, on a bottom of gray mud and fine sand.

This species was taken by the *Albatross* at depths of 1,089 to 1,262 fathoms.

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Genus MATÆOCEPHALUS Berg.

This genus possesses characters intermediate between *Macrourus* and *Cœlorhynchus*. The general form of the head is that of *Cœlorhynchus*, but the spinous occipital ridges characteristic of the species of that genus are lacking and the second dorsal spine is serrate. The tip of the snout is provided with a spinigerous tubercle which is normally bifid, and there is a distinct angulation on the side of the snout with a submarginal groove anterior to it, which renders this portion more or less distensible. An approach to this characteristic form of the snout is found in such species of *Macrourus* as *camurus*, *orthogrammus*, and *parvipes*, and other species, as *hyostomus*, possess a distinct submarginal groove. The intergradations are such as to suggest the desirablility of considering *Matæocephalus* and *Cœlorhynchus* as subgenera under *Macrourus*.

MATÆOCEPHALUS NIGRESCENS Smith and Radcliffe, new species.

Plate 28, fig. 2.

First dorsal II,8; ventrals 8; pectorals 19.

Head 5.20 in total length, depressed, rugose, dorsal contour nearly straight, oblique, no well developed occipital ridges as in species of *Cœlorhynchus;* suborbital ridge salient, ending at a short distance behind vertical from posterior margin of eye; body slender, compressed, greatest depth 8.44 in total length; vent immediately in front of anal; tail long, slender, compressed; eye irregularly subelliptical, horizontal diameter 3.47, vertical diameter 4 in head; interorbital 4.65, flat, a low suborbital ridge present; snout 2.75, broad, depressed, ending in a bifid tubercle; a distinct ridge extending downward in front of nostrils to suborbital margin, its projecting tip forming a distinct angle in lateral contour of snout, in front of this the contour lines converging much more rapidly and the marginal portion is separated from the rest of the snout by a scaleless groove, this portion of snout somewhat membranous, thickened along the margin and covered with spiny scales; mouth small, normal in position, its distance from tip of snout 3.06 in head; mandibular barbel slender, hair-like, about equal to diameter of pupil in length; teeth long, slender, cardiform; scales small, 7 or 8 in each series from origin of dorsal and from last dorsal ray to and including lateral line; spinules slender, recumbent, arranged in 6 to 10 parallel or nearly parallel rows, those on scales of head more nearly erect, giving the head a very rough appearance, especially along the lateral margins; the scales of preopercle encroach on under side of head as do those of anterior part of snout, remainder of under side of head naked.

First dorsal spine small, second spine 1.50 in head, strong, slightly curved, armed with strong, widely set, sharp-pointed spinules; inter-

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dorsal space 2.60 in head; second dorsal rays small, especially the anterior ones; anal well developed, its rays long and slender; ventrals small, inner rays reaching origin of anal, outer ray filamentous 1.93 in head; pectorals 1.93.

Color in alcohol: Ground color dark sepia brown, under side of throat posteriorly, belly and fins blackish; inside of mouth blackish.

Type.—Cat. No. 72942, U.S.N.M., 27 cm. in length, taken with a beam trawl at station 5492 (lat. 9° 12′ 45″ N.; long. 125° 20′ 00″ E.), between Leyte and Mindanao, at a depth of 735 fathoms, on a bottom of gray mud.

M. acipenserinus (Gilbert and Cramer) and *M. microstomus* (Regan) are closely related species and all 3 may prove inseparable. In *acipenserinus* the snout, particularly the part in front of angulation, is longer and more pointed, the bifid tip more prominent, the number of pectoral rays appears to be somewhat greater, and the coloration is much lighter. The description of *microstomus* is too scant to admit of satisfactory comparison; in it the eye is larger, the interorbital relatively narrower, and in the figure the outer ventral ray is not filamentous.

MATÆOCEPHALUS ADUSTUS Smith and Radcliffe, new species.

Plate 28, fig. 3.

Dorsal II,9–85+; anal 100+; ventrals 7; pectorals 16.

Head 4.80 in total length, depressed, dorsal contour nearly straight, oblique, no traces of occipital ridges; suborbital ridge sharp, ending as in other species of the genus near vertical from posterior margin of eye; body slender, compressed, greatest depth 7.40 in total length; vent immediately in front of anal; tail slender, compressed; eye small, subelliptical, horizontal diameter 3.88 in head; interorbital 4.33, narrow, flat; snout 2.90, broad, depressed, bifid tubercle at tip less prominent than in related species, projection of tip beyond angulation relatively short, groove less distinct, more completely scaled, rendering this portion of snout less mobile than in *nigrescens;* mouth small, its distance from tip of snout 3.34 in head; mandibular barbel short, slender, hair-like; teeth slender, in narrow cardiform bands; scales small, regular, 7 in each series from origin of dorsal and from last dorsal ray to and including lateral line, spinules on exposed portion of scale very slender, arranged in about 18 nearly parallel rows (the number somewhat less in the young), these on head small, hair-like; under side of head scaled.

First dorsal spine slender, longer than in most related forms, second spine long, slender, longer than head, 4.52 in total length, basal portion armed with several weak, very widely separated spinules; interdorsal space 2.37 in head; second dorsal low, its rays very slender; anal rays better developed than those of second dorsal; ventrals

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small, inner rays not reaching base of anal, outer ray filamnetous, 2.20 in head; pectoral 1.94.

Color in alcohol: Light brown; belly and opercular region blackish; fins dusky.

Type.—Cat. No. 72943, U.S.N.M., 23 cm. in length, taken with a beam trawl at station 5654 (lat. 3° 42′ 00″ S.; long. 120° 45′ 50″ E.), Gulf of Boni, Celebes, at a depth of 805 fathoms.

This species is readily distinguished from *nigrescens* by the armature of the scales, the less angular form of the snout, the fewer ventral rays, and the fewer, more widely separated spinules on the second spine of first dorsal.

Genus CŒLORHYNCHUS Giorna.

CŒLORHYNCHUS MACRORHYNCHUS Smith and Radcliffe, new species.

Plate 29, fig. 1.

Dorsal II,8–67; anal 76; ventrals 7; pectorals 18.

Head 3.10 in total length, very long, strongly depressed anteriorly, greatest breadth nearly equaling greatest depth, subquadrangular in transverse section, lateral contour of head forming nearly a straight line; suborbital ridge strongly salient, ending abruptly at a distance nearly equal to diameter of pupil from angle of preopercle; the two ridges on each side of nape well developed, converging and meeting over anterior margin of eye; body robust, greatest breadth about 0.66 its depth, the latter 6.44 in total length; vent slightly less than half an eye diameter in front of origin of anal; tail compressed, tapering (tip mutilated, rays of tip well developed); eye subelliptical, horizontal diameter 5.48 in head, slightly more than 0.66 length of snout, vertical diameter 0.66 horizontal diameter; interorbital broad, flat, equal to horizontal diameter of eye; snout 2.15, outlines long, narrow, scarcely at all convex, converging regularly from base to tip, depressed, upper surface everywhere transversely convex, longitudinally slightly concave; width of snout opposite anterior margin of eye 1.73 in its length; anterior nostril small, subelliptical, about 0.4 vertical length of the posterior; mouth relatively large, its anterior margin slightly in front of nostrils; maxillary 3.48, nearly reaching vertical from posterior margin of orbit; mandibular barbel long, slender, about 0.87 horizontal diameter of eye; teeth slender, cardiform, those along outer margin of upper jaw very slightly enlarged; scales large, imbricate, 6 in a series from origin of dorsal to and including lateral line, the same number in a series from last dorsal ray to and including lateral line; scales on body armed with about 7 radiating subequal spinous ridges, posterior spines projecting but little beyond margin of scales; scales of the median dorsal line of snout, those between the two lateral ridges on each side of nape, on opercle and distal portion of preopercle, and

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along suborbital ridge have the ridges very distinct, strongly radiating; other scales of head smaller, their ridges not so sharply defined.

Tip of snout to origin of dorsal 2.92 in total length; first dorsal spine inconspicuous; second 3.41 in head, long, slender, smooth throughout; interdorsal space 4.02 in head, the base of first dorsal being only about 0.55 of the interdorsal space; origin of anal under origin of second dorsal, its rays much longer and stronger than those of the second dorsal; ventrals small, outer ray with a short filament, its length 4.31 in head, tip not reaching vent, ventral base under base of lower pectoral rays; pectoral 2.83, equal to postorbital part of head.

Color in alcohol: Hair-brown; the fins, their bases, and branchiostegal membranes, dark clove-brown.

Type.—Cat. No. 72944, U.S.N.M., 56 cm. in length, taken with a beam trawl at station 5367 (lat. 13° 34′ 37″ N.; long. 121° 07′ 30″ E.), Verde Island Passage, Luzon, at a depth of 180 fathoms, on a bottom of sand.

In small specimens the snout is 2 in head; the eye is somewhat larger; the outer ventral ray reaches to or beyond origin of anal; the average number of radiating ridges on the scales is somewhat less, the longitudinal ridges on head are more distinct, and the second dorsal spine does not reach origin of second dorsal; in older examples this difference is much greater.

C. quadricristatus and *flabellispinis* of Alcock, from the Indian Ocean, and *C. tokiensis* of Steindachner and Döderlein, from Japan, appear to be closely related species. From *quadricristatus* the main differences are a much longer interdorsal space, fewer rays in the first dorsal, and an absence of black cross bands on body. In *flabellispinis* the snout is shorter, the eye is larger, the interdorsal space shorter, and scales between dorsal and lateral line in fewer number. In *tokiensis* the interdorsal space is shorter, the tip of the second dorsal spine reaching beyond origin of second dorsal, the snout and head shorter, and the eye larger.

The collection contains nine examples 15.2 to 56 cm. in length, taken at depths of 180 to 410 fathoms.

CŒLORHYNCHUS COMMUTABILIS Smith and Radcliffe, new species.

Plate 29, fig. 2.

First dorsal II,9; ventrals 7; pectorals 20.

Head 3.37 in total length, long, relatively slender, subquadrangular in transverse section, slightly deeper than broad, depressed anteriorly, dorsal surface with two pairs of low but well marked spinous ridges, the inner pair on occiput slightly converging mesially, then again slightly diverging, the outer pair continuous with the supraorbital margin, ending immediately in advance of the upper end of

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gill-slit, suborbital ridge salient, ending abruptly in front of angle of preopercle; body rounded, greatest depth 7.28 in total length; vent less than a pupil's diameter in front of origin of anal; tail compressed, tapering; eye subelliptical, horizontal diameter 3.96 in head, about 0.4 length of snout, vertical diameter about 0.75 horizontal diameter; interorbital 4.32, broad, nearly flat, a slight depression behind median ridge of snout; snout 2.35, rather long and narrow, depressed, everywhere transversely convex, longitudinally a little concave, ending anteriorly in a short, slender spine; lateral outlines of snout moderately convex, the narrowing being more rapid in the terminal third, and forming with the projecting spinous tip a slight concavity in this portion of snout; width of snout at anterior margin of eye 1.4 in its length; its width midway between tip and eye less than 0.5 its length, about 0.66 its width opposite anterior margin of orbit; postorbital portion of head 1.33 in snout; nostrils well developed, anterior circular, posterior vertically elongate and weakly crescentic, the area immediately surrounding nostrils devoid of scales; mouth

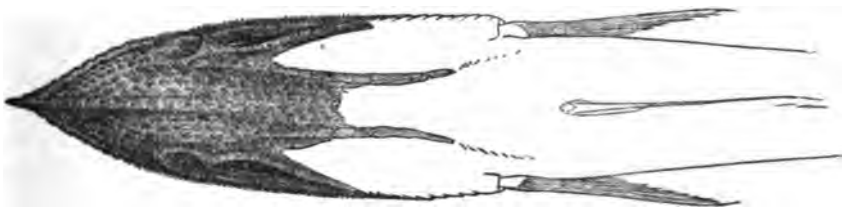

FIG. 2.—CELORHYNCHUS COMMUTABILIS.

large, the distance of its anterior margin from tip of snout 2.64 in head, exceeding postorbital portion of head by about 0.5 diameter of pupil; maxillary 3.80 in head; mandible extending behind vertical from posterior margin of eye; mandibular barbel slender, 0.37 horizontal diameter of eye; teeth incurved, cardiform; scales large, imbricate, 6 in each series from origin of dorsal and from last dorsal ray to and including lateral line; scales on body armed with from 5 to 7 well developed, radiating, subequal ridges; ridges on scales of head higher; those on median longitudinal line of snout, on sides of occiput between the occipital ridges, and on portion of head behind cheek very distinct and rather more divergent; under side of head scaled.

First dorsal well developed, first spine small, length of second slightly greater than distance from tip of snout to anterior margin of pupil; interdorsal space 4.13 in head; second dorsal relatively low; anal rays better developed than the corresponding rays of second dorsal; origin of anal slightly in advance of vertical from origin of second dorsal; ventrals small, outer ventral ray filamentous

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as long as snout, tip reaching beyond origin of anal; pectoral equal to snout in length.

Color in alcohol: Hair-brown; belly, base of fins, and branchiostegal membranes darker.

Type.—Cat. No. 72945, U.S.N.M., 32 cm. in length, taken with a beam trawl at station 5348 (lat. 10° 57′ 45″ N.; long. 118° 38′ 15″ E.), in Palawan Passage, at a depth of 375 fathoms, on a bottom of coral sand.

The type form (fig. 2) is at once distinguished from *C. macrorhynchus* by the much shorter and broader snout and large eye. It differs from *C. japanicus* (Schlegel) in the following characters: Dorsal rays 8 or 9 (9 or 10 in *japanicus*); lateral outline of snout convex (instead of straight); 5 or 6 scales from origin of dorsal to and including lateral line (instead of 6 or 7); 5 to 7 radiating ridges on scales (instead of 3 to 5). The anal rays in *japanicus* are much better developed than in this species.

Our examples of the present species, while fairly constant as far as scaling, form of fins, and body are concerned, nevertheless fall quite

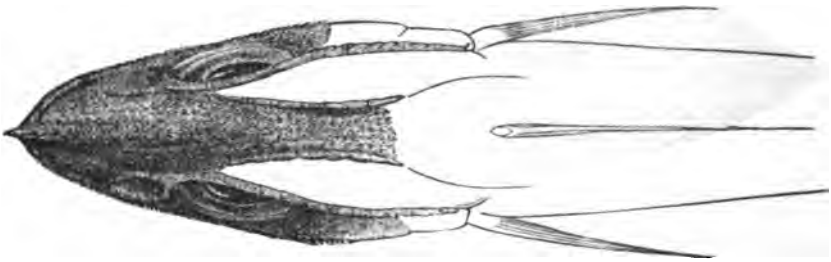

FIG. 3.—CELORHYNCHUS COMMUTABILIS, FORM ALPHA.

readily into one of several groups, each of which, had it been found alone in a separate locality, would have been regarded without doubt as representing a distinct species. The main points of difference of the typical examples of each group lie in the form, length, and scaling of the snout. As the tail is as often mutilated as complete and as a lengthened or shortened snout renders comparative measurements in terms of head of little or no value, the ordinary standardization of measurements does not serve as a satisfactory means of separation. That there is evidence of mutation seems quite certain, and the nature of the organism appears to have been a more important factor than environment in effecting these changes. We have described as the type the form which appears to be predominant; the others are described below as forms *alpha*, *beta*, etc. There are 19 examples of the predominant form from depths of 220 to 375 fathoms.

Form alpha.—Differs from typical *commutabilis* in having a shorter and broader snout, its length 2.50 to 2.80 in head (2.14 to 2.45 in

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typical examples), its projection beyond mouth 1 to 1.10 in post-orbital (0.73 to 1.05 in typical examples), its lateral outline more convex, the breadth in front of eye 1 to 1.24 in its length (1.21 to 1.43 in typical examples), and the eye proportionately longer, 3.29 to 3.77 in head (3.80 to 4.04 in typical examples). Six examples from 260 and 310 fathoms. Figure 3 is of a specimen 28.9 cm. in length taken with a beam trawl at station 5589, near Mabul Island, Borneo, at a depth of 260 fathoms.

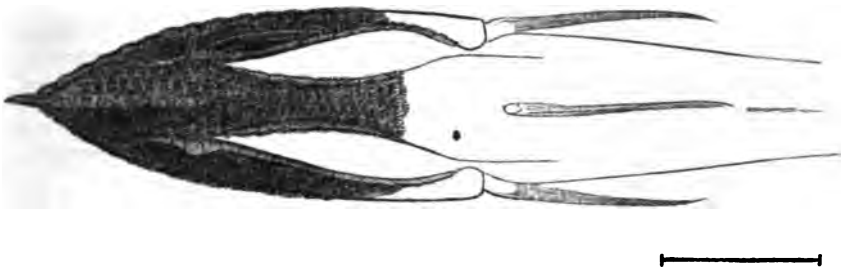

FIG. 4.—CŒLORHYNCHUS COMMUTABILIS, FORM BETA.

Form beta.—Differs in having the under side of the head naked, the snout shorter in examples of the same size, its projection beyond mouth somewhat less, 2.92 to 3.24 in head, and the eye proportionately larger, 3.47 to 3.71 in head. Six examples from 193 to 310 fathoms. Figure 4 is of a specimen 26.8 cm. in length taken with a beam trawl at station 5503, off northern Mindanao, at a depth of 226 fathoms.

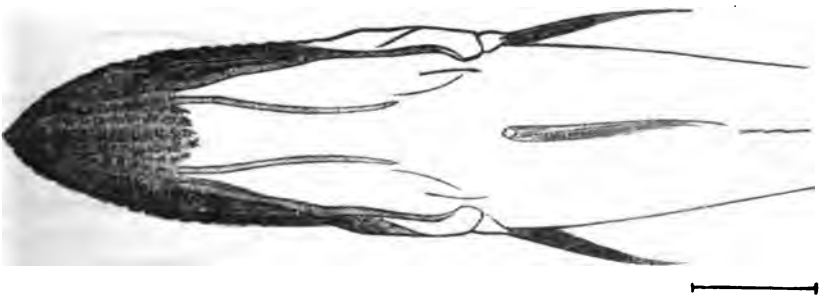

FIG. 5.—CŒLORHYNCHUS COMMUTABILIS, FORM GAMMA.

Form gamma.—Differs in having the dorsal profile of head much more convex, the under side of head naked, the snout shorter, 2.52 to 2.76 in head, broader, 1.07 to 1.26 in its length, less pointed, and slightly upturned at tip; the mouth more anterior than in any of the other forms, its anterior margin in vertical from anterior margin of naked area surrounding nostrils (in related forms its anterior margin is little or not at all in advance of vertical from anterior nostril); projection of the tip of snout beyond mouth 1.11 to 1.38 in post-

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orbital, 3.25 to 3.92 in head (2.47 to 3.11 in typical examples), and the eye is relatively larger than in related forms, 3.17 to 3.50 in head. Five examples from depths of 214 to 279 fathoms. Figure 5 is of a specimen 34.7 cm. in length taken with a beam trawl at station 5502, off northern Mindanao, at a depth of 214 fathoms.

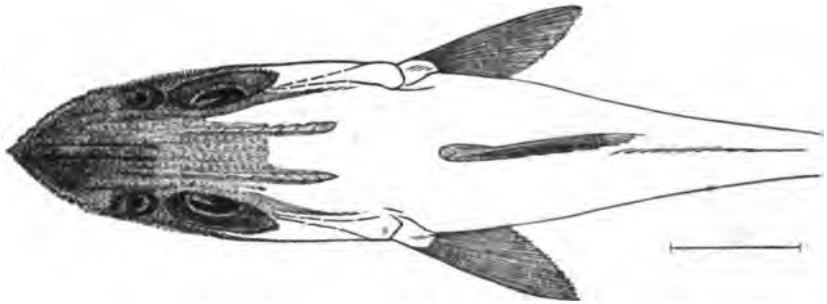

FIG. 6.—CELORHYNCHUS COMMUTABILIS, FORM DELTA.

Form delta.—Although the measurements of this form fall within the limits of typical examples, excepting in breadth of snout and horizontal diameter of eye, the snout is shorter than in examples of the same size, and its lateral outline more convex and less sharply pointed; breadth of snout at anterior margin of eye 1.1 in its length, and horizontal diameter of eye 3.59 in head 1.49 in snout. Under side of head nearly naked, a few scattered scales present posteriorly. A single example (fig. 6), 30 cm. in length, taken with a beam trawl at station 5172, vicinity of Jolo, at a depth of 318 fathoms.

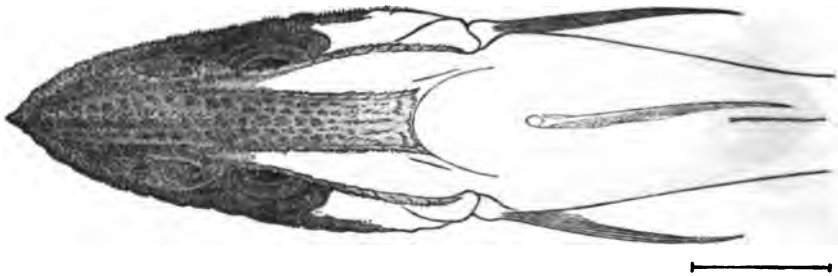

FIG. 7.—CELORHYNCHUS COMMUTABILIS, FORM ETA.

Form eta.—This form has the long snout of typical examples, but differs in having the average breadth of the snout greater, especially anteriorly, and the under side of the head naked. Three examples, taken at depths of 224 to 383 fathoms. Figure 7 is of a specimen 31.5 cm. in length, taken with a beam trawl at station 5325, off northern Luzon, at a depth of 224 fathoms.

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CŒLORHYNCHUS PLATORHYNCHUS Smith and Radcliffe, new species.

Plate 30, fig. 1.

Dorsal II,9–88; anal 88; ventrals 7; pectorals 18.

Head 3.95 in total length, short, broad, greatest breadth and greatest depth being about equal; ridges on occiput distinct, arranged as in *commutabilis;* suborbital ridge salient, ending abrubtly in front of angle of preopercle; body rounded, greatest depth 7.40 in total length; vent less than diameter of pupil in front of origin of anal; tail compressed, tapering; eye subelliptical, horizontal diameter 3.50 in head, about 0.75 length of snout, 1.21 in postorbital; vertical diameter about 0.75 horizontal diameter; interorbital 4.45 in head, 1.54 in postorbital, broad, slightly concave; snout 2.62, short, broad, a strong median ridge on dorsal surface; laterally convex, rather blunt at tip; width of snout at anterior margin of eye equal to its length, its width midway between tip and eye about 0.7 its length;

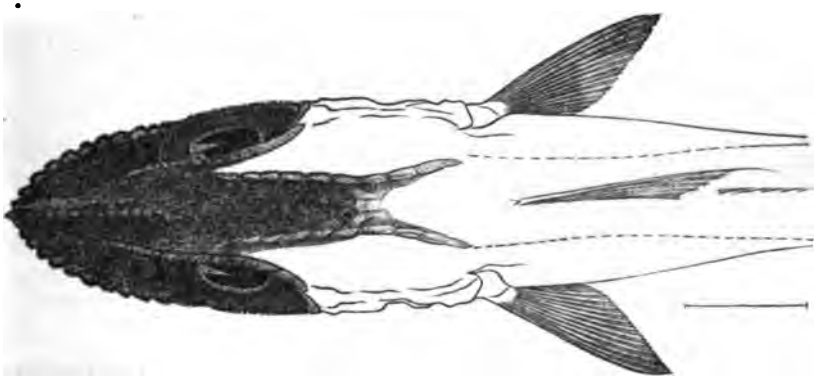

FIG. 8.—CŒLORHYNCHUS PLATORHYNCHUS.

postorbital portion of head 1.09 in snout; nostrils as in *commutabilis;* mouth large, its anterior margin in vertical from posterior margin of anterior nostril, as in the type of *commutabilis,* its distance from tip of snout 2.97 in head, 1.03 in postorbital; mandibular barbel about 0.3 horizontal diameter of eye; teeth incurved, cardiform; scales large, imbricate, quite deciduous, 5 in each series from origin of dorsal and from last dorsal ray to and including lateral line; scales on body armed with from 5 to 7 well-developed radiating ridges; the median ridge in many of the scales somewhat stronger than the others; scales of head and body similar to those found on *commutabilis* except that the ridges are more pronounced, especially those on under side of head.

First dorsal spine small, second longest, nearly as long as snout plus eye; interdorsal 0.22 length of head; second dorsal low; anal rays better developed than the corresponding rays of second dorsal, longest ray about 0.75 horizontal diameter of eye; ventrals small,

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outer ray with a short filament, about 0.45 length of head, tip not reaching origin of anal; pectoral 2.28 in head.

Color in alcohol: Light clove brown, fins somewhat darker.

Type.—Cat. No. 72946, U.S.N.M., 38.7 cm. in length, taken with a beam trawl at station 5585 (lat. 4° 07′ 00″ N.; long. 118° 49′ 54″ E.), Sipadan Island, Borneo, at a depth of 476 fathoms, on a bottom of gray mud.

In the collection there are 3 examples of this species from station 5657 (492 fathoms), 3 from station 5658 (510 fathoms), and 1 from station 5460 (565 fathoms).

This species might be considered an additional form under *commutabilis*, but as the nature of the conditions under which it is found appears to have had a marked influence on its structure, rendering it more readily separable from the other forms (all of the typical examples having been taken from deeper water than specimens of *commutabilis* and showing in their structure characteristic differences), it has seemed best to describe it as a distinct species.

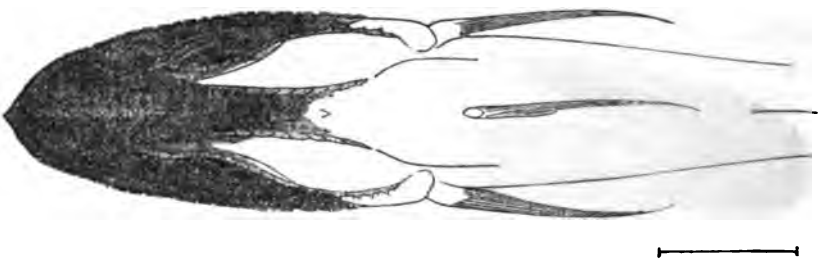

FIG. 9.—CŒLORHYNCHUS PLATORHYNCHUS, FORM ALPHA.

Four specimens, 1 from station 5586 (347 fathoms), 2 from station 5587 (415 fathoms), and 1 from station 5111 (236 fathoms), vary from the typical examples as noted below:

Form alpha.—Differs from typical examples in having the underside of the head naked, a naked area on either side of the median line of snout anteriorly, and the snout less blunt. Figure 9 is of a specimen 31.6 cm. in length, taken with a beam trawl at station 5587, near Sipadan Island, Borneo, at a depth of 415 fathoms.

CŒLORHYNCHUS ACUTIROSTRIS Smith and Radcliffe, new species.

Plate 30, fig. 2.

Dorsal II,8–75; anal 70; ventrals 7; pectorals 15 or 16.

Head 3.30 in total length, strongly depressed anteriorly, ridges on occiput very distinct, arranged as in related species; suborbital ridge strongly salient, ending in a sharp point in front of angle of preopercle; body compressed, greatest depth 6.82 in total length; vent immediately in front of origin of anal; tail compressed, tapering; eye irregularly subelliptical, horizontal diameter 4.60 in head, vertical diameter

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1.17 in horizontal diameter; interorbital 4.77 in head, broad, flat, a slight depression mesially; snout 2.07, long, very narrow, needle-like anteriorly, laterally concave in anterior portion, very slightly convex posteriorly; dorsally the snout is rather strongly concave, with a low median ridge on either side of which is a groove, these converging anteriorly and terminating at base of spine-like tip; mouth small, tip reaching vertical from anterior nostril, its distance from tip of snout 1.20 in length of snout; mandibular barbel slender, hair-like, its length about equal to diameter of pupil; teeth slender, cardiform; angle of preopercle a little produced, its posterior margin slightly concave, directed upward and forward; scales regular, imbricate, 8 in each series from origin of dorsal and from last dorsal ray to and including lateral line; each scale armed with 5 to 7 slightly radiating rows of small, suberect spinules; underside of head naked; traces of a narrow scaleless pit on median line in front of base of ventrals (in some cases this appears to be partially or entirely covered with cycloid scales); a narrow scaleless margin around vent, region in front of vent scaled.

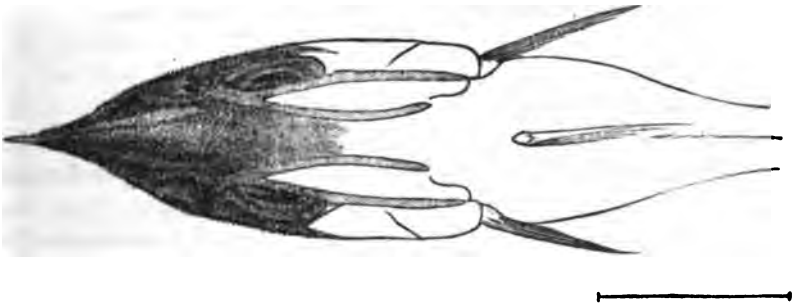

FIG. 10.—CHELORHYNCHUS ACUTIROSTRIS.

First dorsal spine minute, the second smooth; interdorsal space 1.7 in eye, slightly less than base of dorsal; anterior rays of second dorsal slightly longer than succeeding rays; anal similar to second dorsal, its rays somewhat longer; ventrals small, outer ray filamentous, its tip reaching origin of anal; pectoral moderate, slightly longer than postorbital part of head.

Color in alcohol: Ground color dusky olive brown, sides of trunk below pectoral with silvery reflections, becoming blackish on belly; traces of a dark band crossing back behind occiput, extending downward to lateral line, thence backward, then upward across back at origin of second dorsal; another similar band from behind pectoral along side fading out above anterior anal ray; slight dusky shades along median line of back in front of dorsal; first dorsal dusky white, darkest distally, second dorsal whitish; anterior anal rays punctulate with small dark spots, these becoming fewer and more widely separated posteriorly; outer ventral ray whitish, punctulate with darker,

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inner rays much darker; upper pectoral ray blackish, rest of fin dusky white; underside of head cream white; underside of opercle blackish, the dark coloration showing through; lining of mouth whitish anteriorly becoming dusky posteriorly; peritoneum silvery black; no black spot above and behind pectoral.

Type.—Cat. No. 72947, U.S.N.M., 20.5 cm. in length, taken with a beam trawl at station 5418 (lat. 10° 08′ 50″ N.; long. 123° 52′ 30″ E.), between Cebu and Bohol, at a depth of 159 fathoms, on a bottom of gray mud and sand.

This species is very close to *C. gladius* of Gilbert and Cramer, from the Hawaiian Islands, but differs from the descriptions of that species in having fewer rays in the pectoral and the first dorsal (all of the specimens except the type have first dorsal II,7), the filamentous ventral ray reaching base of anal, interdorsal space about 0.5 orbit, the anterior rays of the second dorsal relatively shorter, the ridges on occiput more pronounced, in the absence of a large black spot on side above pectoral, and the anterior anal rays blackish instead of white.

CŒLORHYNCHUS NOTATUS Smith and Radcliffe, new species.

Plate 30, fig. 3.

First dorsal II,9; ventrals 7; pectorals 16.

Head 4.29 in total length, short, occipital ridges low, suborbital ridge salient, ending abruptly in front of angle of preopercle; angle of preopercle projecting, free margin slightly concave; body compressed, greatest depth 6.72 in total length; vent 0.5 diameter of eye in advance of the anal; tail compressed, rather deep anteriorly, tapering posteriorly; eye large, subelliptical, horizontal diameter 3.31 in head, vertical diameter 1.44 in horizontal diameter; interorbital 4.77 in head, broad, flat, equal to vertical diameter of eye; snout 2.74, pointed, its dorsal outline slightly concave; laterally slightly convex; mouth of moderate size, its distance from tip of snout 3 in head; mandibular barbel rather stout, about half horizontal diameter of eye; teeth slender, in a narrow cardiform band; scales regular, 6 in each series from origin of dorsal and last dorsal ray to and including lateral line; each scale armed with about 7 to 9 low, nearly parallel ridges, each ridge composed of long, slender recumbent spinules; underside of head naked; a narrow scaleless fossa extending forward from vent along median line of belly to between base of ventrals.

First dorsal spine small; second spine 1.21 in head (frequently longer than head in smaller examples); interdorsal space about 0.3 of head; 8 series of scales crossing back between dorsal fins; second dorsal low; origin of anal slightly in advance of vertical from origin of second dorsal, its rays much longer than those of second dorsal; ventrals widely separated, outer ray filamentous, 1.80 in head, its

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tip extending behind base of third anal ray; pectoral equal in length to filamentous ventral ray.

Color in alcohol: Ground color of back dusky russet brown, becoming lighter ventrally; belly with blackish shades showing through scales; a small dusky area above opercle; a large circular dark brown area extending from pectoral base upward to lateral line; a broad saddle of similar coloration extending across back behind origin of second dorsal; a second as far behind first as first is behind origin of first dorsal, slightly lighter in coloration; basal sixth of second dorsal spine light brownish yellow, distal portion dusky black, the dark markings of this spine extending onto distal portion of soft rays; second dorsal light; basal portion of anal light, distal portion punctulate with darker, the marginal portion of fin anteriorly almost black; ventrals dusky black, filament of outer ray whitish; pectoral dusky white.

Type.—Cat. No. 72948, U.S.N.M., 27 cm. in length, taken with a beam trawl at station 5162 (lat. 5° 10′ 00″ N.; long. 119° 47′ 30″ E.), Sulu Archipelago, at a depth of 230 fathoms, on a bottom of coarse sand and broken shells.

This species varies considerably in the form and length of the snout, but the variations are less marked than in *C. commutabilis*, and separation into distinct groups is impossible. It appears to be related to *C. australis* and *C. kishinouyei*, but is at once distinguished from these species by the smaller number of keels on the scales.

CŒLORHYNCHUS ARGENTATUS Smith and Radcliffe, new species.

Plate 31, fig. 1.

Dorsal II, 9–100; anal 100; ventrals 7; pectorals 14.

Head 3.88 in total length, pointed anteriorly, robust posteriorly, greatest depth about equal to length of snout plus eye, greatest breadth equal to snout plus 0.33 eye, occipital ridges low, inconspicuous, median pair diverging posteriorly shading into a shallow, scaleless groove which is continuous with lateral line; suborbital ridge scarcely as prominent as in other species; body moderately compressed, greatest depth 6.50 in total length; vent immediately in front of anal; tail strongly compressed, tapering; eye subelliptical, horizontal diameter 4.08 in head, vertical diameter 1.35 in horizontal diameter; interorbital 4, broad, convex; snout 2.80, upper surface convex, lateral outlines nearly straight, region near tip tapering more rapidly than rest of snout; mouth well forward, large; mandibular barbel 1.80 in horizontal diameter of eye, rather slender; teeth slender, cardiform, the outer row slightly enlarged; scales regular, rather deciduous, 7 from origin of dorsal and 6 from last dorsal ray to and including lateral line; spinules on scales inconspicuous, shagreen-like, somewhat irregular in their arrangement, typically divergent,

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each radiating row meeting its fellow on median line; spinules on scales of head hair-like, those following ridges of head scarcely enlarged, unlike the other species of the genus from the Philippines, those on ventral surface of head minute.

First dorsal spine small, second 2.35, smooth; interdorsal space 3.55 in head; anterior rays of second dorsal rudimentary, becoming better developed posteriorly; anal rays much better developed than those of second dorsal; ventrals widely separated, small, outer ray with a short filament, 2.93 in head, reaching about 0.66 distance from its base to vent; pectoral 2.35 in head.

Color in alcohol: Ground color of back light brown, becoming silvery on sides; region around vent grayish black with silvery reflections, this color continued forward along median line of belly to base of ventrals where it widens out, including branchiostegals and extending forward to tip of mandible; cheek, opercles and region immediately below suborbital ridge silvery, the black lining of opercle showing through; fins punctulate with dusky black.

Type.—Cat. No. 72949, U.S.N.M., a gravid female 36.5 cm. in length, taken with a beam trawl at station 5172 (lat. 6° 03′ 15″ N.; long. 120° 35′ 30″ E.), vicinity of Jolo, at a depth of 318 fathoms, on a bottom of fine sand and shells.

The arrangement of the spinules on the scales appears to be somewhat variable, some have the spinules arranged in divergent rows, some in parallel rows and others without apparent regularity in their arrangement. The dark band extending forward from the vent along median line of belly, the somewhat swollen semitransparent appearance of the head and the shagreen-like appearance of the scales are characteristic of the species. The form of the head and the inconspicuous ridges on top of head add weight to the contention that the differences between the species of this genus and *Macrourus* are slight.

MACROUROIDIDÆ Smith and Radcliffe, new family.

Degenerate macrurids with a very large, ellipsoidal head and a short trunk, tapering into a long, compressed, leptocercal tail; a single dorsal of low, feeble rays beginning near nape and continuing to tip of tail; anal fin confluent with the dorsal; ventrals absent; pectorals small, lateral, complete; head and body covered with small spiniferous scales; bones of head very feeble; eye very small; teeth small, villiform, in narrow bands on jaws only; mouth moderate, inferior, horizontal; premaxillary protractile; snout subconic, high, projecting beyond mouth; gill-openings wide; gills 4, a narrow slit behind the fourth; gill-rakers small; pseudobranchiæ absent; branchiostegal membranes joined to the isthmus.

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MACROUROIDES Smith and Radcliffe, new genus.

Characters of the genus indicated in the description of the family.

Type of the genus.—Macrouroides inflaticeps.

MACROUROIDES INFLATICEPS Smith and Radcliffe, new species.

Plate 31, fig. 2.

Dorsal 107+; anal 87+; pectorals 16.

Head 3.20 in total length, its depth 0.78 in its length, very large, ellipsoidal, very soft, cavernous, without prominent ridges, spiny armature or external depressions, the bony structure very feeble and the tissues insufficient to preserve the form in the alcoholic specimen; trunk extremely short, the head converging posteriorly into the slender, strongly compressed, tapering tail, depth at origin of anal 7.94 in total length; vent immediately in front of anal; eye 11.50 in head, 3.40 in snout, very small, circular; snout 3.40 in head, subconic, high, projecting for a considerable distance beyond mouth; nostrils small, immediately in front of eye; mouth moderate, U-shaped, entirely inferior, its cleft horizontal; maxillary 3.07 in head; premaxillaries protractile, lower jaw included; no mandibular barbel; teeth small, subequal, villiform, in very narrow bands, on jaws only; gill-openings wide, apparently a perfectly distinct slit behind the fourth arch; scales very small, covering head and body, each scale with a single mesial spinule, one or two small laterial spinules present on some scales.

Vertical fins low; distance from tip of snout to origin of dorsal 0.33 in total length; dorsal beginning near nape and extending to tip of tail, apparently not divided (the small size of the rays and their broken condition make it impossible to determine the exact form of the anterior part of the fin); remaining rays of nearly uniform height, scarcely longer than diameter of eye, anal similar to dorsal, its rays slightly longer, distance of origin from tip of snout 2.45 in total length; pectoral small, 3.17 in head.

Color in alcohol: Dark clove-brown.

Type.—Cat. No. 72950, U.S.N.M., 14.7 cm. in length, taken with a beam trawl at station 5450 (lat. 13° 23′ 15″ N.; long. 124° 00′ 30″ E.), near Batan Island, Lagonoy Gulf, Luzon, at a depth of 408 fathoms, on a bottom of green mud and coral.

Family ATELEOPODIDÆ.

PARATELEOPUS Smith and Radcliffe, new genus.

This genus differs from *Ateleopus* in the greatly reduced size of the dorsal, which consists of only 3 short rays, and in the much smaller size of the mouth. The head is short and more pointed than in *Ateleopus*, and the strong bony protuberance above and behind the eye is lacking.

Type of the genus.—Parateleopus microstomus.

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PARATELEOPUS MICROSTOMUS Smith and Radcliffe, new species.

Dorsal 3; anal + caudal 91; ventrals 2; pectorals 13.

Head short, pointed, 6.14 in total length, 2.16 in distance from tip of snout to vent, greatest breadth equal to snout plus eye; length of head and trunk 2.80 in total length; depth of body 8.32 in total length, 2.93 in head plus trunk; body and tail compressed, tapering; eye 6.32 in head, 2.55 in snout; snout 2.48, fleshy, pointed, projecting beyond mouth about 0.4 of its length; mouth small, semicircular, horizontal, lips fleshy; maxillary 4.55, not reaching vertical to anterior margin of eye; anterior nostril circular, with a low rim, posterior nostril slit-like, close to eye; no sharp, knob-like structure above or behind eye; a broad band of small teeth on anterior half of each premaxillary; mandible and palate toothless; interorbital 3.17; gills 4, the fourth arch with a slit behind it; gill rakers 7 in number on anterior arch, armed with small teeth; no pseudo-

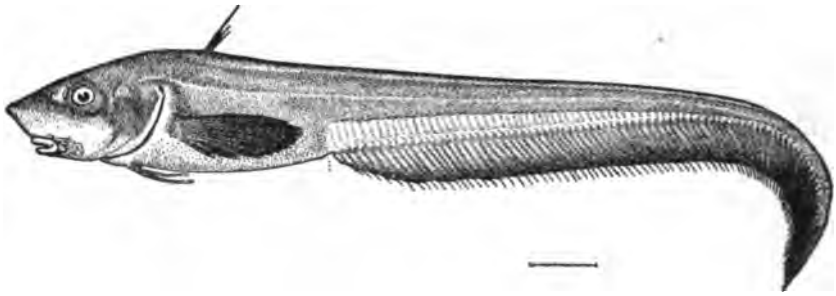

FIG. 11.—PARATELEOPUS MICROSTOMUS.

branchiæ; skin tender, scaleless; lateral line present, inconspicuous, pores widely separated.

Insertion of dorsal fin behind vertical to base of pectoral, first dorsal ray longest, 2.85, its base about one-ninth length of head; anal long, continuous with the caudal, anterior rays short increasing in length posteriorly, longest ray 2.72; pectorals 1.20, well developed, tips not reaching vent; ventrals reduced to a filament, tapering, 2.28, dissection shows filament to be composed of 2 closely joined rays, under the skin are traces of additional rudimentary rays; interhæmals very distinct, covered by a delicate semitransparent skin.

Color in alcohol: Top of head and body seal-brown, becoming sepia on sides of body and tail and gray on ventral surface; dorsal and pectorals very dark brown; ventrals grayish; margin of anal blackish, becoming lighter basally; lips cream-buff; peritoneum silvery with minute dots of brown.

Type.—Cat. No. 72951, U.S.N.M., 35 cm. in length, taken with a beam trawl at station 5622 (lat. 0° 19′ 20″ N.; long. 127° 28′ 30″ E.), near Makyan Island, Dutch East Indies, at a depth of 275 fathoms, on a bottom of gray mud.

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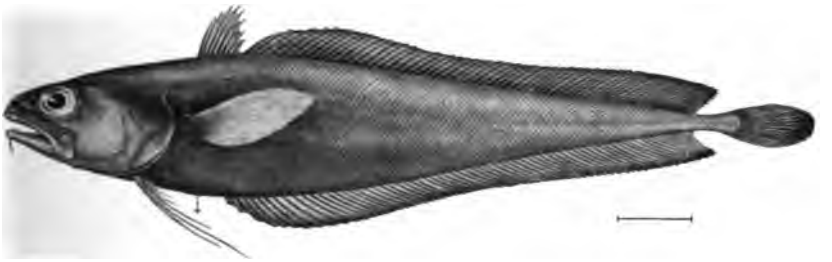
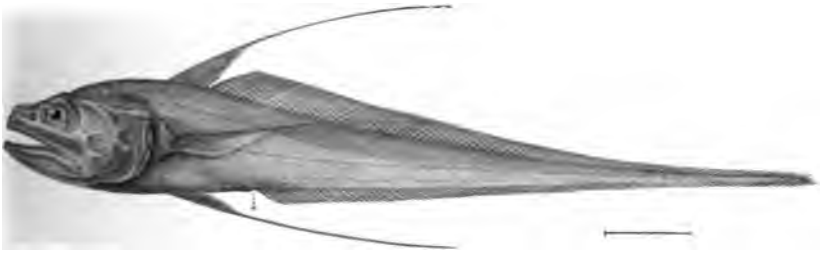


1. PHYSICULUS NIGRESCENS. (PAGE 105.)



2. REGANIA FILAMENTOSA. (PAGE 107.)

3. REGANIA SULCATA. (PAGE 108.)

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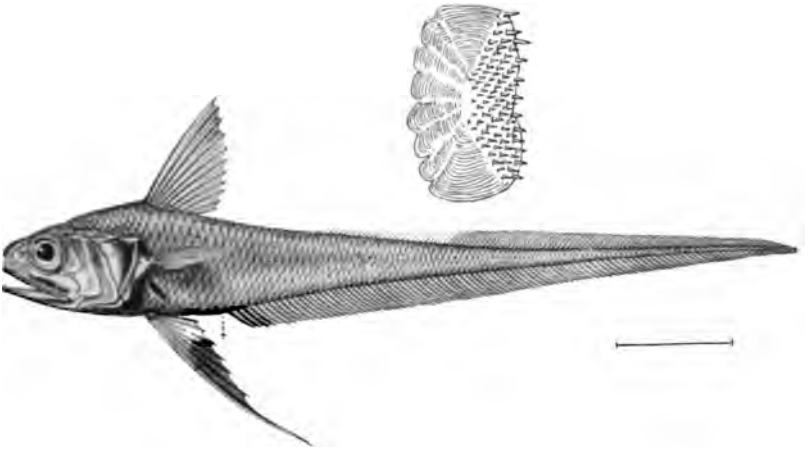
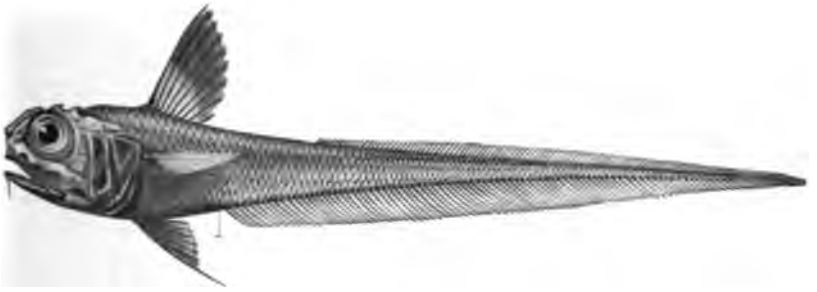
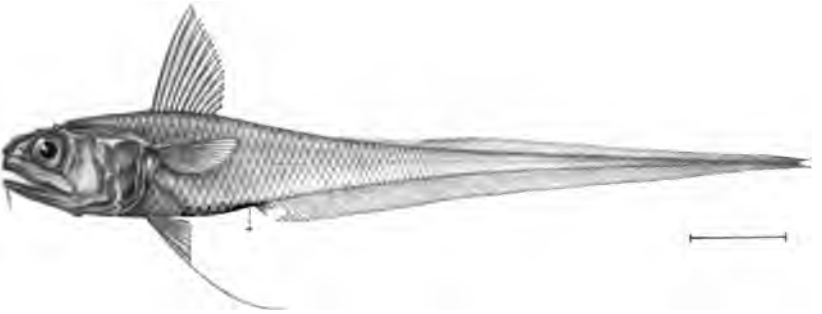


1. HYMENOCEPHALUS LONGIPES. (PAGE 109.)



2. HYMENOCEPHALUS TORVUS. (PAGE 110.)



3. HYMENOCEPHALUS LONGICEPS. (PAGE 111.)

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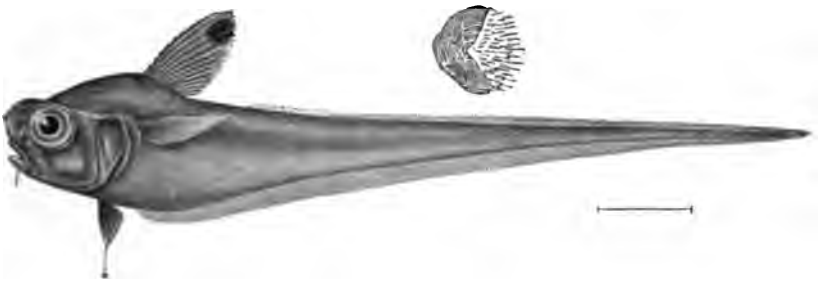
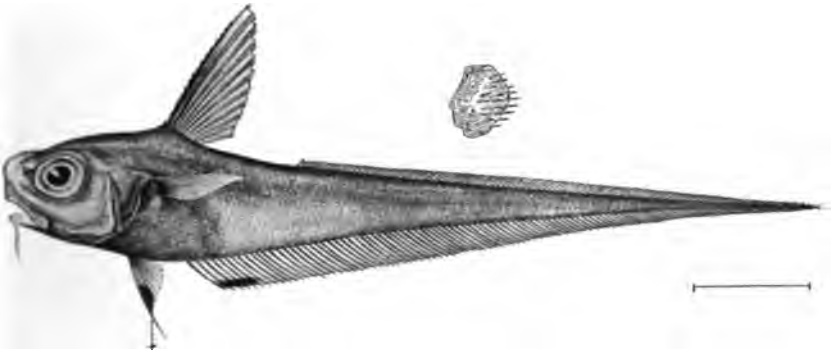


1. MACROURUS LUCIFER. (PAGE 113.)



2. MACROURUS NIGROMARGINATUS. (PAGE 114.)

3. MACROURUS MACRONEMUS. (PAGE 115.)

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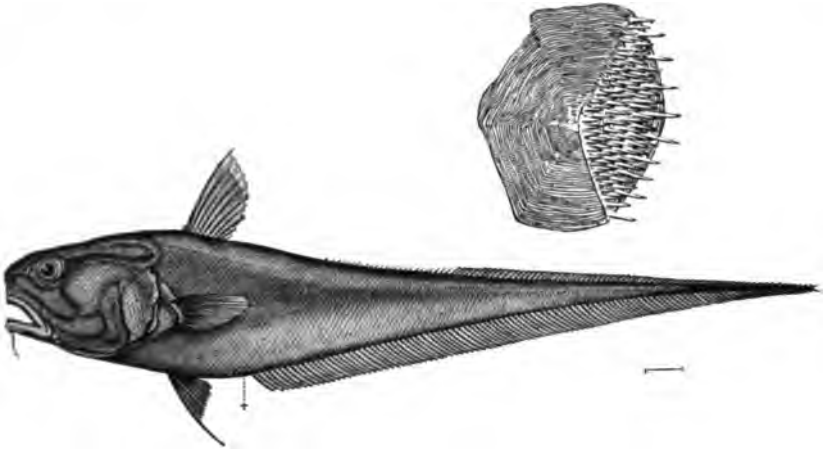
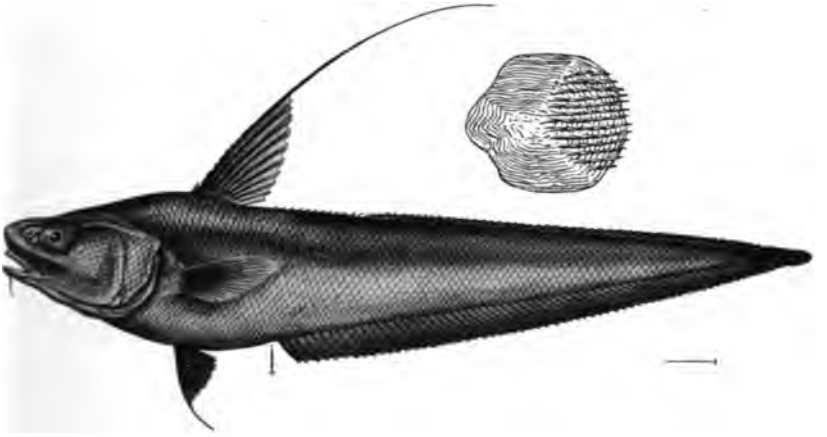
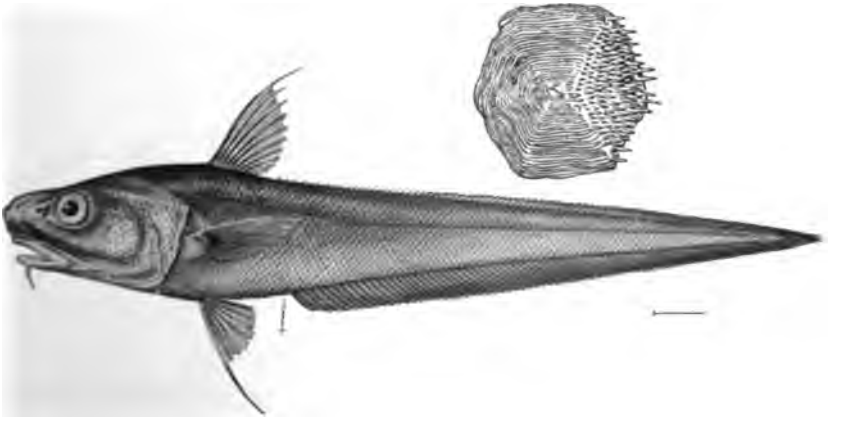


1. MACROURUS PARADOXUS. (PAGE 115.)



2. MACROURUS MICROPS. (PAGE 116.)



3. MACROURUS DUBIUS. (PAGE 117.)

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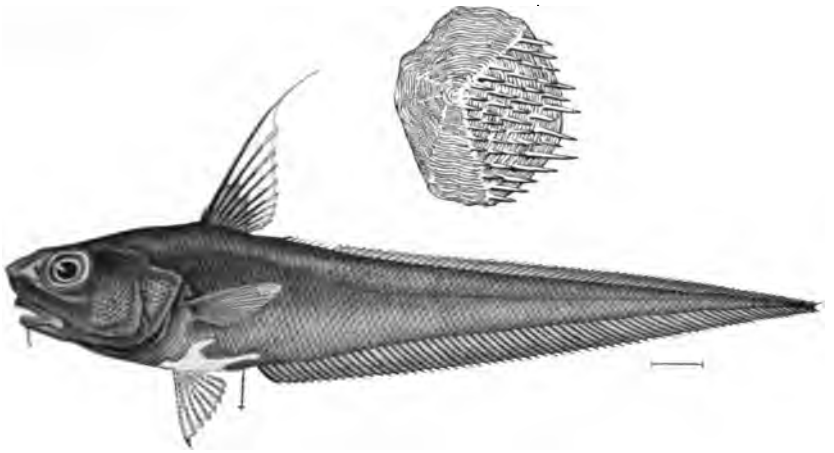
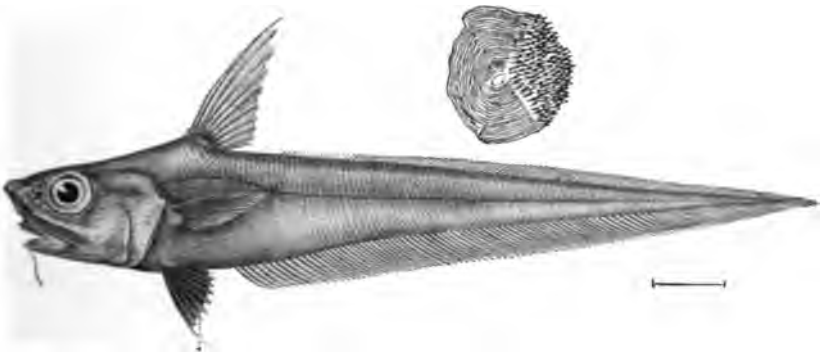
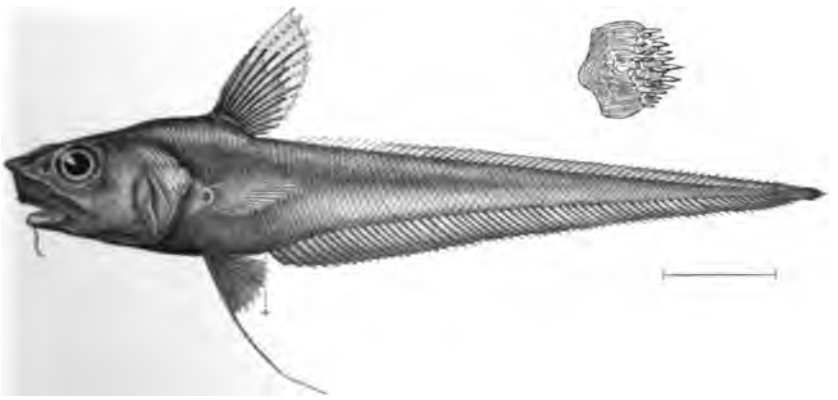


1. MACROURUS ASPRELLUS. (PAGE 118.)



2. MACROURUS PROXIMUS. (PAGE 119.)



3. MACROURUS ÆQUATORIS. (PAGE 120.)

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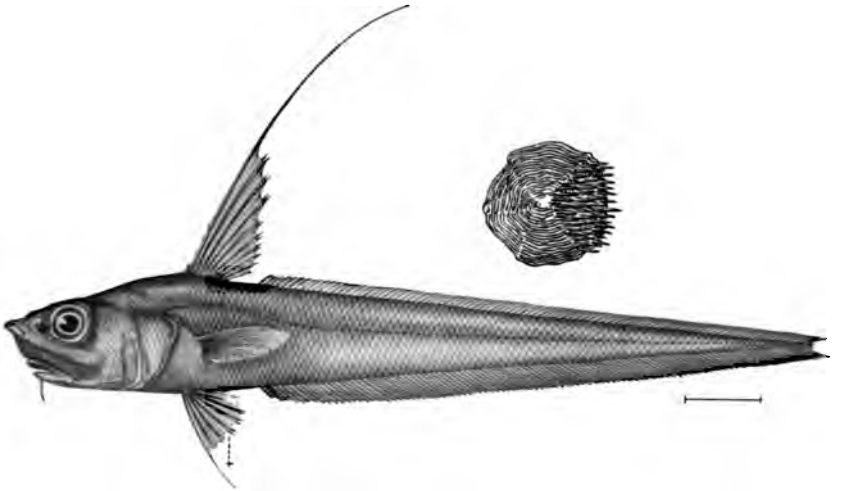
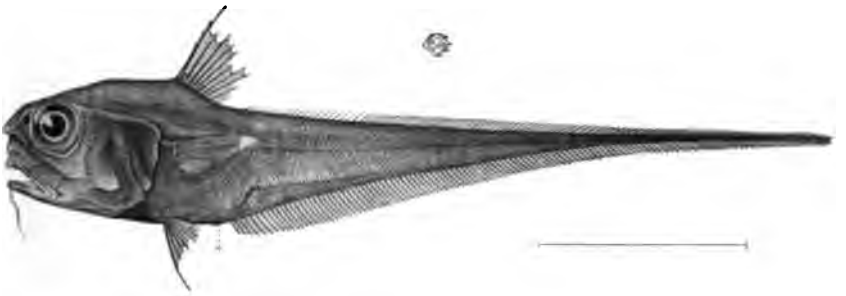
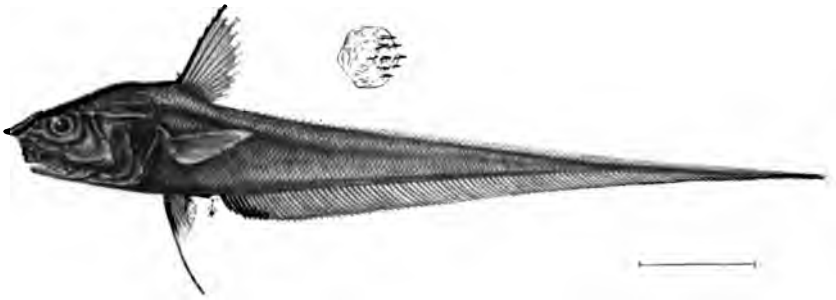


1. MACROURUS HYOSTOMUS. (PAGE 121.)



2. MACROURUS CAMURUS. (PAGE 122.)



3. MACROURUS ORTHOGRAMMUS. (PAGE 123.)

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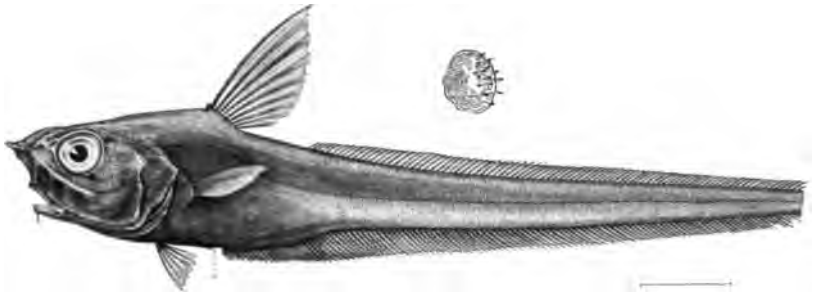
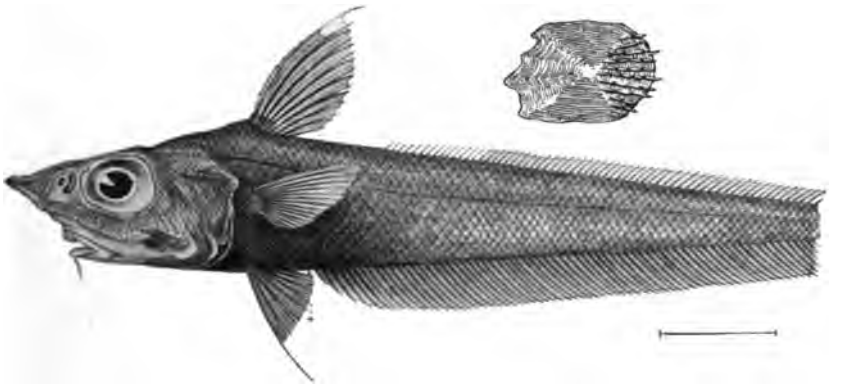
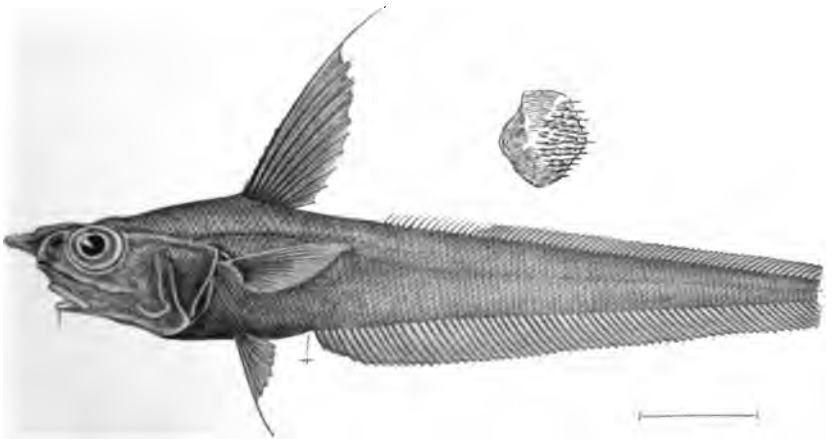


1. MACROURUS PARVIPES. (PAGE 124.)



2. MATÆOCEPHALUS NIGRESCENS. (PAGE 125.)



3. MATÆOCEPHALUS ADUSTUS. (PAGE 126.)

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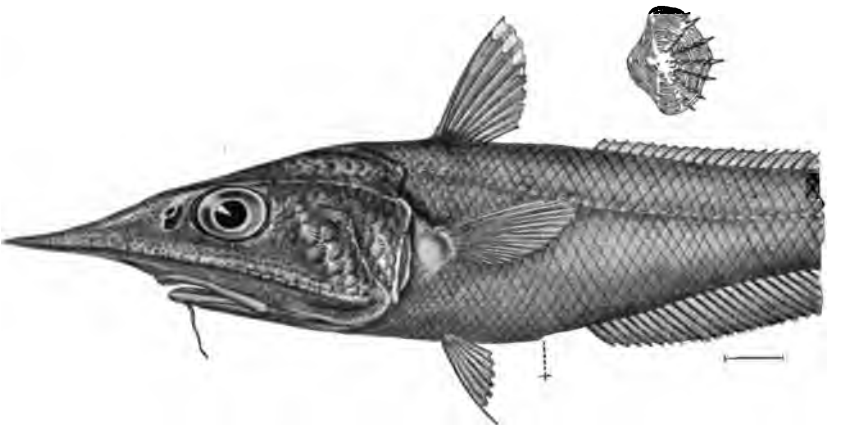
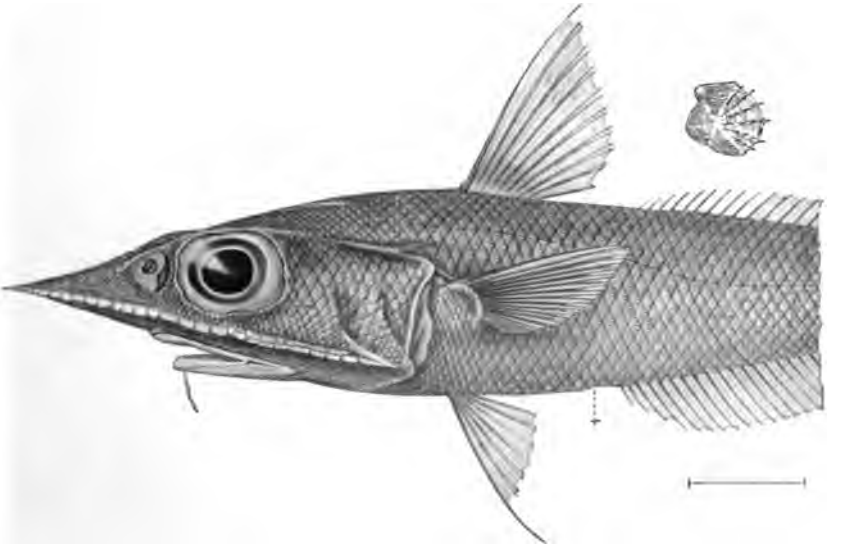


1. CŒLORHYNCHUS MACRORHYNCHUS. (PAGE 127.)



2. CŒLORHYNCHUS COMMUTABILIS. (PAGE 128.)

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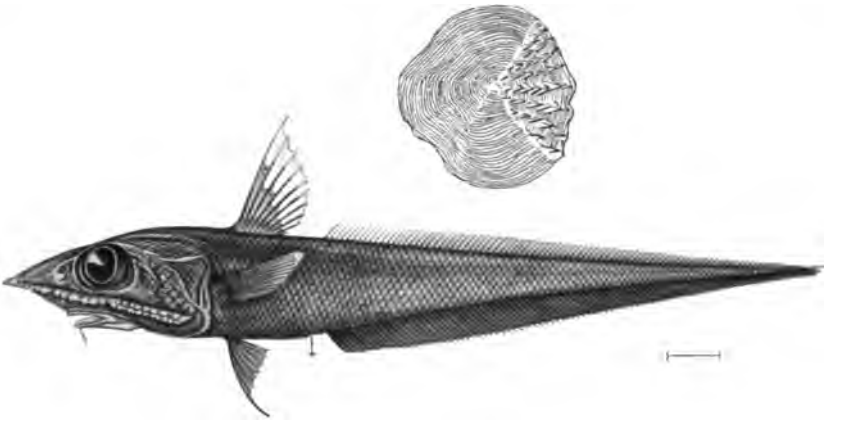
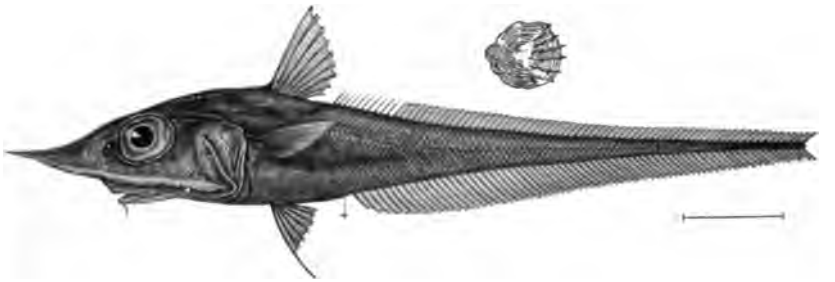
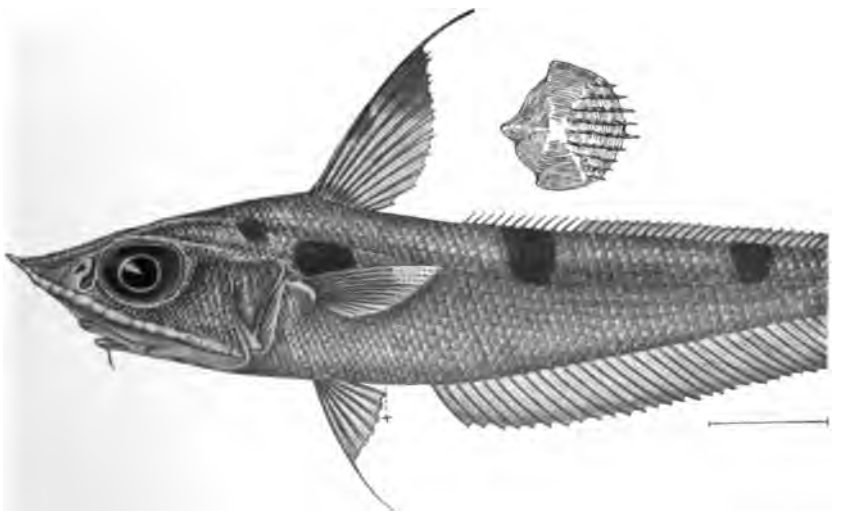


1. CŒLORHYNCHUS PLATORHYNCHUS. (PAGE 133.)



2. CŒLORHYNCHUS ACUTIROSTRIS. (PAGE 134.)



3. CŒLORHYNCHUS NOTATUS. (PAGE 136.)

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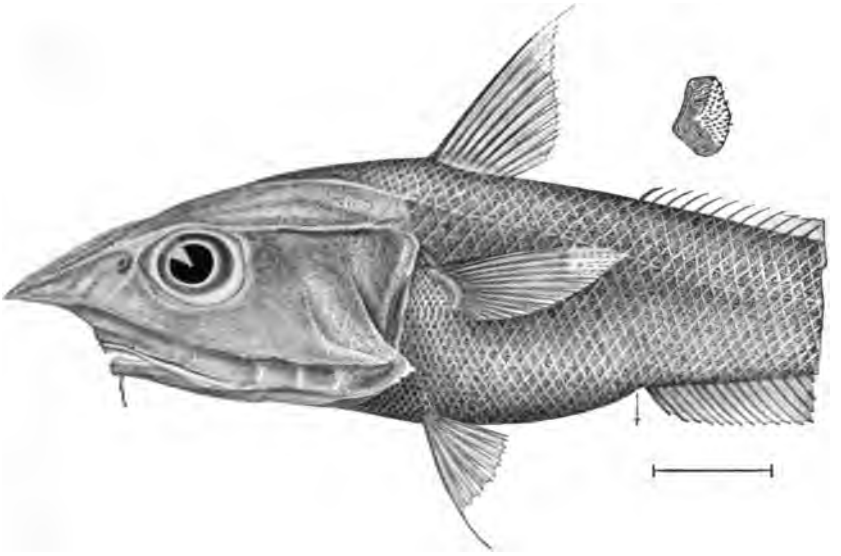
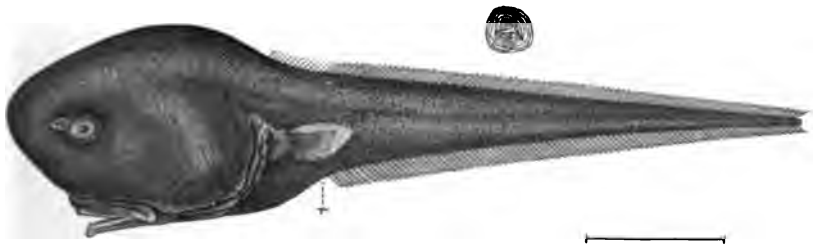


1. CŒLORHYNCHUS ARGENTATUS. (PAGE 137.)



2. MACROURIDES INFLATICEPS. (PAGE 139.)

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STUDIES IN THE WOODWASP SUPERFAMILY ORYSSOIDEA, WITH DESCRIPTIONS OF NEW SPECIES.

By S. A. ROHWER,

Of the Bureau of Entomology, United States Department of Agriculture.

INTRODUCTION.

In arranging the collection of Oryssidæ, of the United States National Museum and the branch of forest insects, Bureau of Entomology, a few apparently new species were encountered. In describing these insects it was deemed advisable to bring together all the available information concerning the habits and to present such systematic notes as were necessary. The following paper can only be treated as a preliminary outline and will have to be revised when more material is available and more definite information has been secured.

This paper is a contribution from the branch of forest insects of the Bureau of Entomology of the United States Department of Agriculture.

HABITS.

Very little is known about the habits of the Oryssidæ. The adults are very active, and are found on posts and near the wood of dead trees. They have been found on trunks of coniferous trees, on maple trees, on timber, and on various posts. They are active, and run and jump or fly short distances, reminding one of certain Chalcid flies. Very little definite information can be obtained about the larvæ, although it is generally believed that they are internal feeders in wood. It has even been suggested [1] that the insects are parasitic, but this has not been proven. Nothing has been published concerning the larvæ of the American species, except an apparently erroneous statement by Glover (1877) in which it is stated that "the larvæ bore in the wood of the willow." More has been published concerning the European species. Wachtl (1882) bred *Oryssus abientinus* from *Alnus incana* at the same time that he bred the beetle *Dicerca alni*. Rudow (1909) says that the same species occurs solitary on

[1] Harrington, 1893, p. 151.

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white birch in connection with *Xiphydria*. Gaulle (1906) gives the host plants of the common European species as *Fagus sylvatica* and *Alnus incana*. Konow (1902) records the same species from *Fagus sylvatica* and says the larvæ are smaller than those of *Tremex*. Unfortunately, in the table of larvæ nothing is said of *Oryssus*, so we do not know if its larval characters are the same as those of *Tremex* or not. For America we have an observation made by A. D. Hopkins which seems to confirm the theory that *Oryssus* is parasitic. An Oryssid pupa was found in an old mine of a Cerambycid (see p. 156). Did this insect crawl in the Cerambycid mine to pupate? If so, where did it spend its larval period? Or, was the Oryssid parasitic on the Cerambycid?

GEOGRAPHICAL DISTRIBUTION.

The Oryssoidea are so rare and their habits so imperfectly known that it is very difficult to map their distribution. If we knew the host plants, or knew that they are restricted to certain host plants, we could plot their distribution with more assurance. From the accompanying maps (pls. 32–33) it will be seen that as a superfamily they are found in all of the major regions, but singularly are absent in Palæarctic 3 and 4[1]; Oriental 1, 2, and 3; Australian 4; and Æthiopean 4. The Nearctic and Palæarctic (1 and 2) have only the genus *Oryssus*, but this genus is also represented in the Neotropical and Australian regions. The Neotropical region has the genera *Oryssus* and *Ophrynopus*. The Æthiopean has *Chalinus*, and recently a species of *Oryssus* has been added. The Oriental (4) has the two genera *Mocsarya* and *Stirocorsia*. The Australian has representatives of *Oryssus* and *Ophrynopus*.

EXTERNAL ANATOMY.

Head.—Seen from in front, the head is transversely oval; the eyes large, converging toward the vertex; malar space large;[2] ocelli present, the lateral ones close to the inner margins of the eyes and in some specimens somewhat imperfect; posterior orbits narrower below; vertex tuberculate; front with or without carinæ; clypeus consolidated with the front; antennæ inserted in a groove above the base of the mandibles; labrum small, free, present between the bases of the mandibles; mandibles small, stout, broad apically and more or less dentate; antennæ in the female 10-jointed, with the ninth joint large and the apical one small, slender in the male 11-jointed, and of the normal type; maxillary palpi long, slender, 5-jointed; labial palpi short, clavate, 3-jointed.

The head of the Oryssidæ is very specialized, and as yet, not thoroughly understood. It seems probable that the clypeus may be con-

[1] The figures refer to Wallace's Zoological Regions described in his Island Life, 1876.

[2] See note under *Ophrynopus ? dentifrons*.

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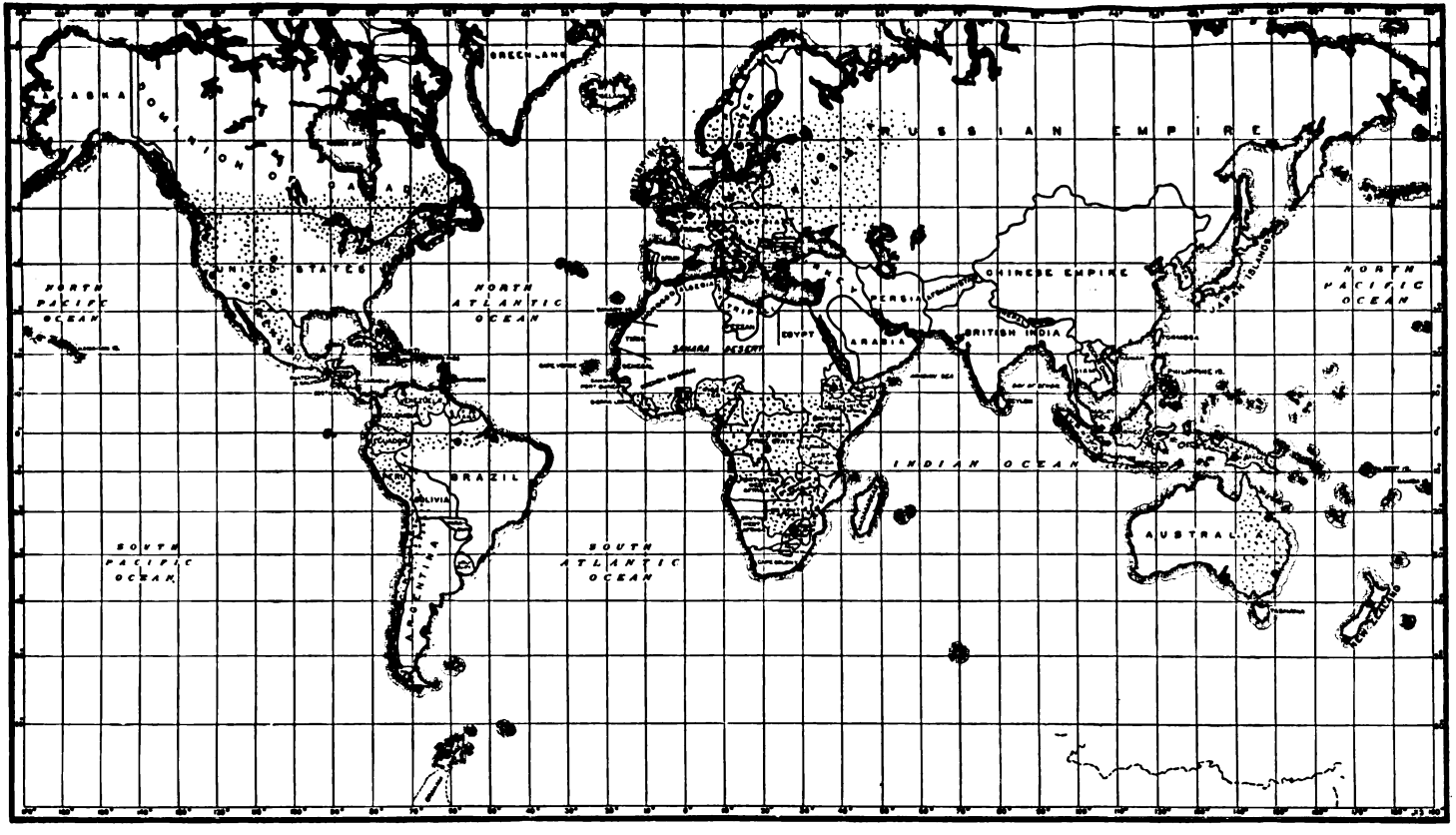

MAP OF THE WORLD, SHOWING THE DISTRIBUTION OF THE SUPERFAMILY ORYSSOIDEA.

FOR REFERENCE SEE PAGE 142.

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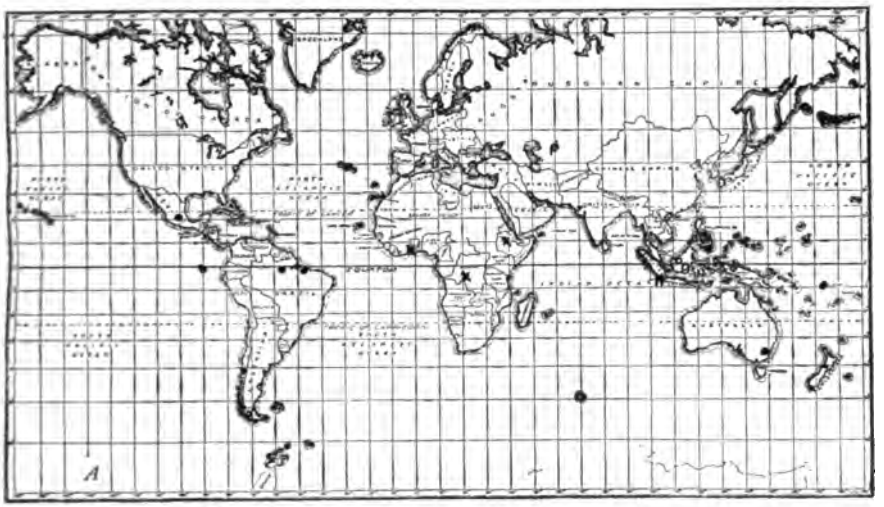
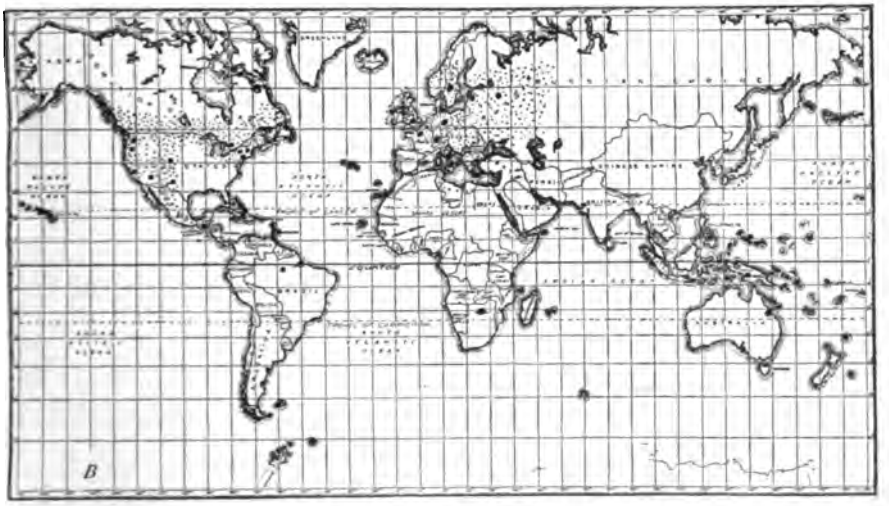


MAP SHOWING DISTRIBUTION OF STIROCORSIA (O), CHALINUS (X), MOCSARYA (H), AND OPHRYNOPUS (●).



MAP SHOWING DISTRIBUTION OF ORYSSUS.

FOR REFERENCE SEE PAGE 142.

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cealed and the so-called clypeus may not be the clypeus. This statement is made because of the position of the antennæ. Considering that the clypeus is consolidated with the front it is necessary to assume that the antennæ are inserted below the clypeus which is improbable. (See fig. 1.)

Thorax.—Pronotum narrow, perpendicular, posterior margin arcuate, posterior lateral margin straight; proepimeron wanting; proepisternum large, meeting ventrally for almost its entire length, forming anteriorly a small circular opening; prosternum small, diamond-shaped in outline; mesoprescutum wanting; mesoscutum wider than long, the anterior margin arcuate, the posterior margin truncate; wings inserted near the posterior third; mesoscutellum completely separated from the mesoscutum, the anterior margin truncate, the posterior obtusely pointed; first thoracic spiracle between the pronotum and mesoepisternum; mesosternum and mesoepisternum not separated; mesolocus present; prepectus distinctly imperfectly defined; mesoepisternum and mesoepimeron very poorly separated, the suture very indistinct anteriorly; mesoepisternum with a raised area extending from near lower part of second coxa to tegula; mesosternum and episternum with a transverse suture a short distance before the intermediate coxæ; metanotum not differentiated into areas; cenchri present; metapostnotum wanting; metepisternum small; metepimeron almost concealed anteriorly by the overlapping metanotum and propodeum, posteriorly large, extending beyond the posterior margin of the propodeum. (See fig. 2.)

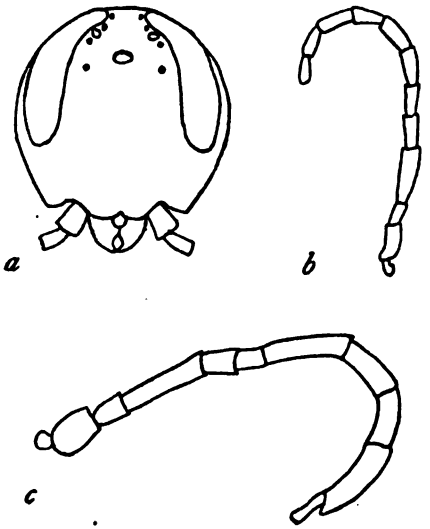

FIG. 1.—ORYSSUS. (*a*) HEAD FRONT VIEW; (*b*) MALE ANTENNA; (*c*) FEMALE ANTENNA.

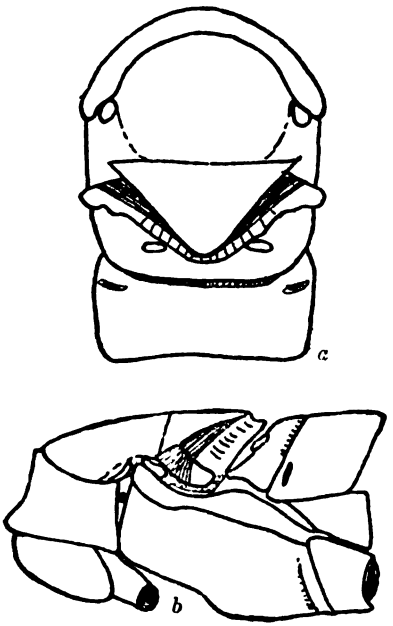

FIG. 2.—THORAX OF ORYSSUS. (*a*) DORSAL VIEW; (*b*) LATERAL VIEW.

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Wings.—Wings as in figure 3. In some exotic genera the anal cell is broadly contracted, there being a very small basal cell present. In certain exotic genera the cubitus joins the costa at the same place as the basal vein, and does not join the basal vein as in *Oryssus*.

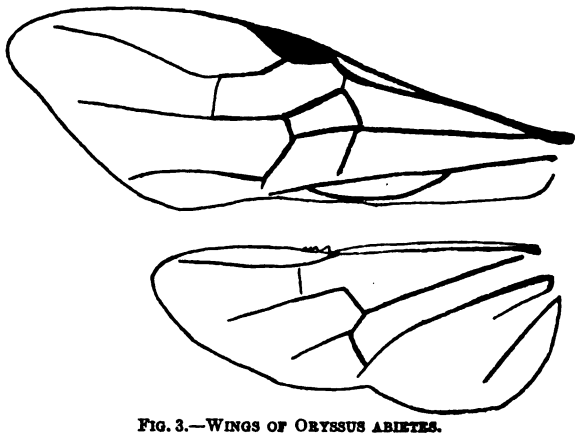

FIG. 3.—WINGS OF ORYSSUS ABIETES.

Legs.—The legs, contrary to the usual rule, show much modification in the female, while in the male they are of the usual type. In the male the legs are as follows: Coxæ rather large, all of them contiguous; trochanters long, the posterior ones 2-jointed, the basal division being the longer; femora stout; tibiæ rather slender, armed apically with one calcarium although the second calcarium on the two posterior pair is often represented by rudiments, the four posterior ones enlarged apically and somewhat curved, the posterior ones simple or serrate on their outer edge; tarsi long, slender, longer than their tibiæ, pulvilli wanting, empodia present but not large, claws with an erect inner tooth. In the female the legs differ from the male as follows: Four posterior legs differing only in the rather shorter tarsi; anterior tibiæ irregular in outline, the calcarium bifid apically; anterior tarsi 3-jointed, the basal joint distinctly longer than the two following. (See fig. 4.)

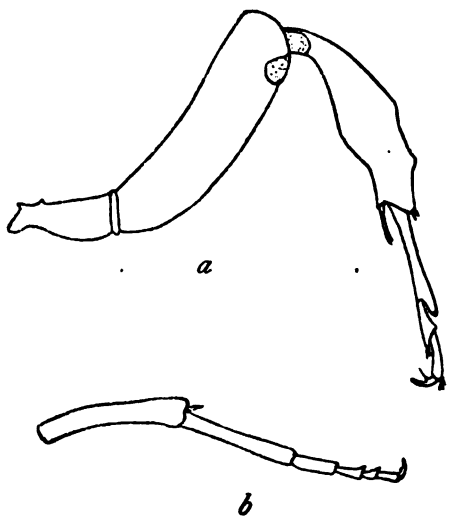

FIG. 4.—LEGS OF ORYSSUS. (*a*) FORELEG OF O. ABIETES, FEMALE FROM THE COXA; (*b*) FORELEG OF O. SAYI MALE FROM THE APEX OF THE FEMORA.

Abdomen.—The abdomen, which is cylindrical, is composed of eight tergites and eight sternites. The first tergite is called the propodeum and is undivided. The first two tergites are more coarsely sculptured than the following and are separated from each other by a

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foveolate furrow. Third to seventh (inclusive) tergites normal. The eighth tergite produced posteriorly so as to be longer in the dorsal middle. First sternite reduced to a very small plate which is present in the middle only. Second to fifth (inclusive) sternites normal, extending much beyond the apical margins of the corresponding tergites. Sixth sternite emarginate in the apical middle. Seventh sternite lengthened in the middle where it is divided by the sheath (first gonapophyses). Eighth sternite long, bearing two longitudinal carinæ which inclose an area called the hypopygidium. These carinæ curve outward and upward at the apex and define a small, somewhat circular area. The eighth sternite is grooved down the middle. In this groove the ovipositor (second and third gonapophyses) rests so it appears to issue, when in normal position, from between the eighth sternite and eighth tergite, but in truth it is exserted between the seventh and eighth sternite. Sheath very short, not nearly as long as the ovipositor. Spiracles wanting, or concealed, when the abdomen is held in normal position, by imbrication as in the forficulids, beyond the first tergite. Cerci* wanting. In the male the abdomen has the opening apically, the genitalia concealed, and the apical sternites regular in outline and no defined area on the eighth sternite. (See fig. 5.)

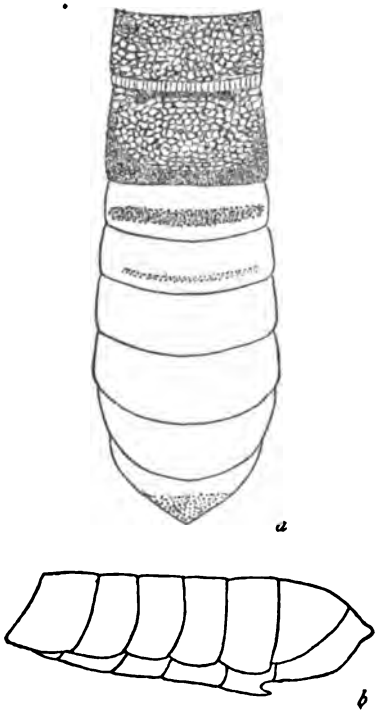

FIG. 5.—ABDOMEN OF ORYSSUS. (*a*) DORSAL VIEW; (*b*) LATERAL VIEW FROM THE SECOND.

RELATIONSHIPS OF THE SUPERFAMILY.

The superfamily Oryssoidea is a very distinct group in the suborder Chalastogastra and is perhaps the most highly specialized group within the suborder. By the older writers they have been considered as a group within the Siricidæ (Siricoidea of some authors and Xylophaga of others). Of later years they have been treated as a group of equal value with the siricids and tenthredinids. MacGillivray (1906, p. 648) and Enslin (1911, p. 438) treated the group as a family, while Rohwer (1911, p. 217) considers it to be a superfamily. With the Siricoidea the Oryssoidea show relationship in the habits (being internal feeders in wood), the complete separation of

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the scutellum from the scutum; the one calcarium of the anterior tibiæ, the loss of notauli, the loss of the proepimeron; and they are more like them in venation than other Chalastogastra. The loss of cerci would place them near Tremicinæ. It may be that they were derived from the Tremicinæ, but they may easily be separated from this group by the characters found below. From the standpoint of the wings MacGillivray (1906, p. 646) said:

> So far as their wings are concerned the presence of the second anal cell in the front wings is the only structure that would place the genus *Oryssus* in the superfamily Tenthredinoidea.[1]

Ashmead (1898, p. 177) expressed the opinion that Oryssidæ were apparently,

> the stem from whence some of the parasitic Hymenoptera originated, i. e., the Megalyridæ, Stephanidæ, etc.

CLASSIFICATION.

The present paper being of preliminary nature, it is only possible at present to point out certain characters which have not been used heretofore in systematic work on these insects, with the hope that other workers will endeavor to make use of them. The prepectus is well defined in *Ophrynopus*, while it is poorly defined in *Oryssus* and *Chalinus*. This character may prove useful to separate genera. The use of the number and type of the facial carinæ may not be the most natural classification, but it is shown on page 142 that it goes hand in hand with the assumed southern extension of the group. The dentation of the hind tibiæ may be of some value. Specific characters may be found on the so-called clypeus, the relation of antennal joints, the shape of the hypopygidium, and other characters mentioned in the following table. Harrington (1886–7) was of the opinion that all the American species were the same and that certain well-marked color forms existed. To adopt Harrington's synonymy would mean that the characters found on the antennæ, clypeus, and others are not of specific value. Without more conclusive evidence it is much better to treat these as distinct. It may be, however, that Harrington had before him only one species and that this species varied as his material indicated. Bradley (1901, p. 317) expressed the opinion that the color represented constant specific differences, and Konow (1905*b*, p. (354) 178) went even further than Bradley in recognizing *affinis* Harris.

Superfamily ORYSSOIDEA.

Oryssoidea ROHWER, Proc. Ent. Soc. Wash., vol. 13, No. 4, 1911, p. 217.

Distinguishing characters.—Pronotum with the posterior margin strongly curved; mesoscutum extending much beyond the anterior margin of the tegulæ; abdomen with eight sternites and eight tergites;

[1] MacGillivray uses the term "Tenthredinoidea" in the sense of "Chalastogastra" of the author.

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abdominal spiracles wanting or concealed; eyes converging above; antennæ inserted much below the eyes and below the apparent clypeus; proepimeron wanting; first perapteron wanting; propodeum not divided; anterior wings with two cubital cells; fore tarsi of female 3-jointed, of male 5-jointed.

Family ORYSSIDÆ Cameron.[1]

Oryssites NEWMAN, Ent. Mag., vol. 2, 1834, p. 409.
Oryssina THOMSON, Hym. Scand., vol. 1, 1871, p. 331.
Oryssidæ CAMERON, Monogr. Brit. Phy. Hym., vol. 3, 1889, p. 137.—SHARP, Cambr. Nat. Hist., vol. 5, 1895, p. 506.—ASHMEAD, Can. Ent., vol. 30, 1898, p. 177—BRADLEY, Trans. Amer. Ent. Soc., vol. 27, 1901, p. 317—ROHWER, Proc. Ent. Soc. Wash., vol. 13, No. 4, 1911, p. 217—ENSLIN, Deutsch. Ent. Zeit., 1911, p. 438.
Oryssinæ DALLA TORRE, Cat. Hym., vol. 1, 1894, p. 378.
Oryssini KONOW, Term. Fuz., vol. 20, 1897, p. 602; Genera Insectorum, fas. 28, 1905, p. 9.

Characters of the superfamily.

GENERIC SYNOPSIS.

The following generic synopsis is adapted from Konow, 1905*b*, page 177. *Lithoryssus* Brues is omitted (see p. 148).

Vertex tuberculate..... 1.
1. Face without carinæ..... *Oryssus* Latreille.
Face with two or four carinæ..... 2.
2. Facial carinæ convergent, two in number..... *Chalinus* Konow.
Facial carina divergent..... 3.
3. Discoidal cell sessile; face with four carinæ..... *Mocsarya* Konow.
Discoidal cell petiolate; face with two carinæ..... 4.
4. Posterior orbits with a carina; anal cell of the fore wings petiolate. *Stirocorsia* Konow.
Posterior orbits without a carina; anal cells of the fore wings broadly contracted. *Ophrynopus* Konow.

Genus CHALINUS Konow.

Chalinus KONOW, Term. Fuz., vol. 20, 1897, p. 605.

Type.—Oryssus plumicornis Guerin (Rohwer, 1911).

Chrysoryssus ASHMEAD, Can. Ent., vol. 30, 1898, p. 177.

Type.—Oryssus imperialis Westwood (Monobasic).

Genus MOCSARYA Konow.

Mocsarya KONOW, Term. Fuz., vol. 20, 1897, p. 608.

Type.—Oryssus metallicus Mocsary (Monobasic).

Genus STIROCORSIA Konow.

Stirocorsia KONOW, Ent. Nachr., vol. 23, 1897, p. 372.

Type.—Stirocorsia kohli Konow (Monobasic).

[1] Ashmead, 1898, says that Haliday 1839 recognized this group as a family, but no record of such has been found.

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Genus OPHRYNOPUS Konow.

Ophrynopus KONOW, Term. Fuz., vol. 20, 1897, p. 605.

Type.—Ophrynopus andrii Konow (Rohwer, 1911).

OPHRYNOPUS (?) DENTIFRONS (Philippi).

Oryssus dentifrons PHILIPPI, Stettin. Ent. Zeit., vol. 34, 1879, p. 303, pl. 1, figs. 5 *a–c*.

This species, which was overlooked by Konow, may form a new genus. If the figure is correct it may be separated from *Ophrynopus* by the very short malar space, and the facial carinæ are (judging from the description) nearly parallel.

Genus LITHORYSSUS Brues.

Lithoryssus BRUES, Bull. Amer. Mus. Nat. Hist., vol. 22, 1906, p. 492.

Type.—Lithoryssus parvus Brues (Monobasic).

Brues described a Hymenopteron which he says should fall in *Oryssinæ* Konow. This genus is known only from the description, but judging on this basis, I doubt if the genus belong to this group; in fact, it may not even be a Chalastogastran. If the number of abdominal segments is correct it can not belong in Oryssidæ, as at present defined, or even in Chalastogastra. The fewest number of abdominal segments in the Chalastogastra occur in the Oryssoidæ, where there are eight. The venation is also quite different.

Genus ORYSSUS Latreille.

Oryssus LATREILLE, Précis Char. Gen. Insect., 1796, p. 111.—FABRICIUS, Suppl. Ent. Syst., 1798, p. 218.

Type.—Oryssus coronatus Fabricius (Latreille, 1810).

The genus *Oryssus* was established in 1796 by Latreille, but no species were placed in it until 1798, when Fabricius placed *Oryssus coronatus* Fabricius and *Oryssus vespertilio* Fabricius in the Latreillian genus. The first of these was made the type of the genus by Latreille in 1810. At present both forms are regarded as the same.

(A)[1] Second antennal joint distinctly more than half as long as the third; a distinct carina behind the eyes; thorax ferruginous.

ORYSSUS THORACICUS Ashmead.

Oryssus thoracicus ASHMEAD, Can. Ent., vol. 30, 1898, p. 178.—BRADLEY, Trans. Amer. Ent. Soc., 1901, p. 318.

Female.—Length, 4.75 mm.; clypeus regularly rounded, the apical margin depressed, not emarginate; front below the ocelli regularly reticulate; posterior orbits irregularly reticulate behind the carina which is close to the eye; postocellar line distinctly shorter than the intraorbital line; second antennal joint distinctly more than half the length of the third, third subequal with the two following, sixth about

[1] The grouping is based on the female.

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one-fourth longer than the seventh, seventh and eighth subequal in length; mesoscutum with two poorly defined longitudinal furrows, the anterior portion between these furrows more finely sculptured than the rest of the mesoscutum; scutellum irregularly reticulate; venation strong; hypopygidium as in figure 6*a*. Black; thorax, propodeum, and legs, except when mentioned, ferruginous; antennæ piceous; spot on anterior femora, and all the tibiæ exteriorly white; wings hyaline, strongly dusky below stigma; venation dark brown.

Santa Cruz Mountains, California.

Type.—Cat. No. 6845, U.S.N.M.

This is a very distinct little species. Ashmead erroneously described this as a male. His type, which is unique, is a female.

(B) Second antennal joint half or less than half as long as the third; no well defined carina behind the eyes; thorax black.

(I) Seventh and eighth antennal joints subequal; second antennal joint half as long as the third; abdomen black or with the three apical segments pale.

ORYSSUS SAYII Westwood.

Orysus sayii Westwood, Zool. Journ., vol. 5, 1835, p. 440.—Harris, Rept. Ins. Mass. 1841, p. 394.—Westwood, Thesa. Ent. Oxon. 1874, p. 120, pl. 22, fig. 7.—Cresson, Trans. Amer. Ent. Soc., vol. 8, 1880, p. 49.—Provancher, Addit. Corr. Fauna Ent. Can. Hym., 1889, p. 27.—Harrington, Can. Ent., vol. 18, 1886, p. 30; vol. 19, 1887, p. 81; vol. 19, 1887, p. 239.—Packard, Rept. U. S. Ent. Comm., 1890, p. 383.—Dalla Torre, Cat. Hym., 1894, p. 380.—Bradley, Trans. Amer. Ent. Soc., 1901, p. 318.—Konow, Zeit. Hym. Dept., vol. 5, 1905, p. 182 (358).

The original description by Westwood is as follows:

♀: Niger; capite thoraceque punctatis abdomine subtilius punctato; vertice, ad regionem ocellorum, tuberculato; facie lineis duabus minutis abbreviatis albis inter oculos ad marginem inferiorum; labro albido; antennis nigris, apice articuli 3tii articulisque 4to et 5to supra albo-notatis; pedibus nigris, apice femorum lineolaque supra tibiali albis; alis dimidio basali hyalinis, dimidio apicali fuscis et ad costam obscurioribus, macula parva substigmaticali apiceque ipso hyalinis, stigmati nigro.

Long. corp. ♀ lin. 7½. Exp. alar. lin. 11.

Habitat, in America boreali "New Harmony."

In Mus. nostr. Dom. G. B. Sowerby communicavit.

Note.—In the Enclopedia Methodique, vol. 8, p. 561, a second species of this remarkable genus was added by Latreille under the name of *Or. unicolor*, of which both sexes had been captured in the Bois de Boulogne, near Paris. Its characters very much resemble those of the species above described, except that *Or. unicolor* is only half the size of *Or. coronatus*, whereas my new species is somewhat larger than that insect.

Westwood's (1874) figure of the antennæ places this species in group B I. According to his figure the fourth and fifth antennal joints of the female are subequal.

The following description is of males which have been determined as *sayii*:

Male.—Length, 11.5 mm. Clypeus gently rounded, not crenulate laterally, with a deep median notch; front shining, coarsely irregularly reticulate; lateral ocelli situated on a line drawn between the third and fourth tubercles; postocellar line distinctly shorter than the intraorbital line; third antennal joint distinctly shorter than the

fourth and fifth; mesoscutum reticulate, with two poorly defined longitudinal areas which are finely striato-punctate; scutellum reticulate, with a small, shining, sparsely punctate area basally; venation weak, black; fourth and fifth antennal joints beneath, spot on dorsal apices of femora, tibiæ (in part) exteriorly yellowish-white; wings hyaline, strongly dusky beyond base of stigma (except hyaline tip of anterior wings); venation pale brown or yellowish, costa and stigma black.

Hampton, New Hampshire, June 13 and 21, 1911, collected by S. A. Shaw; Ottawa, Canada (Ashmead collection).

ORYSSUS MODESTUS, new species.

Female.—Length, 12.5 mm. Anterior margin of the clypeus rounded out, crenulate laterally, notched in the middle, a tooth in the middle notch; front below the ocelli and posterior orbits coarsely, irregularly reticulate; postocellar line subequal in length with the intraorbital line; second antennal joint half the length of the third, third longer than the fourth and fifth, fifth about half the length of the fourth, seventh and eighth subequal; mesoscutum uniformly reticulate; scutellum punctured, more sparsely so in the middle, longitudinally depressed posteriorly; venation strong; hypopygidium sharply and regularly narrowing apically. Black; apex of the third, the fourth and fifth antennal joints beneath, spot on dorsal apices of femora, basal half of tibiæ exteriorly yellowish-white; tarsi piceous; wings dusky hyaline, radial and costal cells strongly dusky; venation black. (See fig. 6*b*.)

Hoquiam, Washington. One female collected May 29, 1905, by H. E. Burke.

Type.—Cat. No. 14663, U.S.N.M.

Judging from the color, this species is the same as *sayii* Westwood, but the antennæ of *sayii* have, according to the figure, the fourth and fifth joints subequal, while in *modestus* the fourth joint is much longer than the fifth.

ORYSSUS TERMINALIS Newman.

Oryssus terminalis NEWMAN, Ent. Mag., vol. 5, 1838, p. 486.—HARRIS, Rept. Ins. Mass., 1841, p. 394.—BRADLEY, Trans. Amer. Ent. Soc., vol. 27, 1901, p. 318.—KONOW, Zeit. Hym. Dipt., vol. 5, 1905, p. 181 (357).—DALLA TORRE, Cat. Hym., 1894, p. 380.

The original description by Newman is as follows:

Niger, rugosus, abdominis segmentis 3 ultimis rufus; antennarum articulis 4 et 5 extus, femora apice extus, tibiæ basi extus nivea; proalæ ante apicem fascia transversi lata fusca stignatæ. (Corp. long. 5 unc.; alar. dilat. 775 unc.)

Somewhat resembles *O. coronatus*, a species inhabiting the south of Europe, but differs in the detail of its coloring; the head has a crown of tubercules, is rugosely punctured, and entirely black; the antennæ (a character of the genus) are situated immediately adjoining the mouth at the insertion of the mandibles, and appear as if belonging to the instrumenta cibaria; they are black, with the exception of the exterior

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portion of the fourth and fifth joints, which is snowy white; the extreme apex of each femur, and about two-thirds of the exterior portion of each tibiæ, is also white; the three segments which terminate the abdomen are red.

Inhabits North America. Taken by Mr. Doubleday, at Trenton Falls.

The following is a description of the species determined as *terminalis:*

Female.—Length, 12 mm. Anterior margin of the clypeus gently rounded out, not crenulate laterally, with a deep median notch; front below ocelli and the posterior orbits coarsely, irregularly reticulate; lateral ocelli on a line between the third and fourth tubercules; postocellar line distinctly shorter than the intraorbital line; second antennal joint half the length of the third, third longer than the fourth and fifth, fifth about half the length of the fourth, seventh distinctly longer than the eighth; mesoscutum reticulate, with two longitudinal depressed areas which are anteriorly finely punctured and posteriorly striato-punctate; scutellum reticulate laterally, shining and sparsely punctured in the middle; venation weak; hypopygidium gently, gradually tapering to the apex, see figure 6*d*. Black; three apical segments rufous; fourth, fifth and base of sixth antennal joints beneath, spot on dorsal apices of femora, tibiæ (in part) exteriorly whitish; wings hyaline, strongly dusky beyond the stigma (except the fore wings which have the apex hyaline); venation pale brown or yellowish, stigma and costa dark brown.

Hampton, New Hampshire. One female collected June 21, 1911, by S. A. Shaw; Ottawa, Canada (Ashmead collection).

This may only be a form of following species, as it differs only in the shape of the hypopygidium.

ORYSSUS HÆMORRHOIDALIS Harris.

Oryssus hæmorrhoidalis HARRIS, Rept. Ins. Mass., 1841, p. 394.—NORTON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 350.—PROVANCHER, Nat. Can., vol. 10, 1878, p. 227; Petite Fauna Ent. Can. Hym., 1883, p. 237.

Harris, after saying that *hæmorrhoidalis* was the same as *terminalis*, described his species as follows:

Female.—Her body is black, rough before, and smooth behind, with the last three segments of a blood red color. The outer side of the fourth and fifth joints of her antennæ, her knees, and a line on the outer edge of her skins, are white. Her feet are dull red. Her wings are clear and transparent, with a broad, smoky brown, transverse band, beyond the middle of the first pair. Her body measures nearly six-tenths of an inch in length.

The following is a description of a species which is considered to be *hæmorrhoidalis*:[1]

Female.—Length, 12 mm. Anterior margin of the clypeus rounded out, not crenulate laterally, with a distinct median notch; front below

[1] Rather than describe the two species, which have usually been considered as one, and called *terminalis*, the names "*terminalis*" and "*hæmorrhoidalis*" are used. By an examination of the types, if they are still in existence, the matter may be set straight.

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the ocelli and posterior orbits coarsely, irregularly reticulate; lateral ocelli situated on a line drawn between the third and fourth tubercules postcellar line distinctly shorter than the intraorbital line; second antennal joint half as long as the third, third longer than the fourth and fifth, fifth about half as long as the fourth, seventh distinctly longer than the eighth; mesoscutum coarsely punctured, with two longitudinal depressed areas which are more finely punctured and posteriorly striato-punctate; scutellum coarsely punctato-reticulate; hypopygidium very sharply and regularly narrowed apically, see figure 6*h*. Black; three apical abdominal segments rufous; fourth and fifth antennal joints beneath, spot on dorsal apices of femora and tibiæ (in part) exteriorly yellowish-white; wings hyaline, strongly dusky beyond the stigma (except apices of fore wings which are hyaline); venation pale brown or yellowish, costa and stigma black.

North Cornway, New Hampshire, June 26, 1909; Hampton, New Hampshire, June 21, 1911. Collected by S. A. Shaw, New York.

ORYSSUS MAURUS Harris.

Oryssus maurus HARRIS, Rept. Ins. Mass., 1841, p. 394.—NORTON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 351.

Harris, after saying that *maurus* was the same as *sayii*, described it as follows:

Female.—It is of a deep black color, rough before and smooth behind, and is marked with white on the antennæ and legs, like the red-tailed kind, with the addition of two, short, white lines on the forehead, between the lower corners of the eyes. The feet are black. The wings have a smoky band beyond the middle, which, however, fades away towards the inner margin. I have seen only females of this species, and they measure from four to five tenths of an inch in length.

New England States.

This has usually been considered the same as *sayii*, but in view of the uncertainty should be held as distinct.

ORYSSUS AFFINIS Harris.

Oryssus affinis HARRIS, Rept. Ins. Mass., 1841, p. 394.—NORTON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 351.—PROVANCHER, Addit. Corr. Fauna Ent. Can. Hym., 1889, p. 28.—DALLA TORRE, Cat. Hym., 1894, p. 379.—KONOW, Zeit. Hym. Dipt., vol. 5, 1905, p. 181 (357).

The original description is as follows:

Male.—It is possible that my *Oryssus affinis*, which is a male, may be the mate of the foregoing dark-colored species [*maurus*], from which it differs in having reddish feet, and in wanting the two white spots on the forehead. It measures four-tenths of an inch in length.

New England.

Konow is wrong in saying the legs are red, as the original description says feet, which is synonymous with tarsi.

(II) Eighth antennal joint distinctly shorter than the seventh; second antennal joint less than half as long as the third; abdomen red beyond the second segment.

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ORYSSUS OCCIDENTALIS Cresson.

Oryssus occidentalis CRESSON, Proc. Ent. Sec. Acad. Nat. Sci., Phila., 1879, p. 9; Trans. Amer. Ent. Soc., vol. 8, 1880, p. 48.—PROVANCHER, Addit. Corr. Fauna Ent. Can. Hym., 1889, p. 27.—DALLA TORRE, Cat. Hym., 1894, p. 379.—BRADLEY, Trans. Amer. Ent. Soc., vol. 27, 1901, p. 318.—KONOW, Zeit. Hym. Dipt., vol. 5, 1905, p. 181 (357).

The original description was as follows:

Black, opaque; head coarsely punctured, the vertex gibbous, crowned with six or seven acute tubercles encircling the lower ocellus; clypeus acutely margined at tip which is truncate; cheeks very prominent; joints 3-6 of antennæ more or less white above; thorax depressed, densely punctured; scutellum triangular, acute at tip; wings smoky beyond stigma; knees and line on outer side of tibiæ, white, tarsi fulvo-testaceous, sometimes more or less obfuscated; abdomen shining, ferruginous, basal segment black, scabrous. Length 0.40 to 0.60 inch. ♂, ♀.

Habitat.—Colorado, Nevada (Morrison). Eight specimens.

Type.—Collection American Entomological Society.

Bradley (1901, p. 318) says there are variable white spots between the eyes. These markings probably exist only in the male.

What has been determined as this species may be described as follows:

Female.—Length, 11 mm. Anterior margin of the clypeus rounded out, crenulate laterally; face below the ocelli and posterior orbits coarsely reticulate; postocellar line longer than the intraorbital; lateral ocelli between the third and fourth series of tubercules but nearer the third; second antennal joint less than half the length of the third, the third longer than the fourth and fifth, fifth less than half the length of the fourth, seventh longer than the eighth; mesoscutum regularly punctato-reticulate; scutellum punctured, sparsely so along the middle; venation strong; hypopygidium regularly narrowing toward the apex. Black; abdomen beyond the second segment red; apex of third, fourth, and fifth antennal joints beneath, spot on dorsal apices of femora, tibiæ (in part) externally white; tarsi rufo-piceous; wings dusky hyaline, radial and cubital cells strongly dusky; venation dark brown. (See fig. 6*c*.)

South Bend, Washington. One female crawling on bark of old white spruce (*Picea sitchensis*). Collected by H. E. Burke and recorded under Bureau of Entomology number "Hopk. U. S. 1950*c*." Also a female from Mount Hood, Oregon.

ORYSSUS ABIETES, new species.

Female.—Length, 15 mm. Anterior margin of the clypeus gently rounded, depressed, slightly crenulate laterally, without a median notch; front below the ocelli and posterior orbits reticulate, usually uniformly so; posterior orbits not carinate although there is a gently raised area where the carina is normally situated; postocellar line subequal with the intraorbital line; second antennal joint less than half the length of the third, third longer than the fourth and fifth,

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fourth distinctly longer than the fifth; eighth distinctly shorter than the seventh beneath; mesoscutum uniformly reticulate, except along the shining middle where there is a longitudinal furrow; scutellum shining, sparsely punctured except posteriorly the punctures are confluent; venation strong; hypopygidium as in figure 6*g*. Black; abdomen beyond the first segment red; apex of third, the fourth and fifth and base of sixth antennal joints beneath, spot on apices of femora above, and tibiæ beneath (except apices) white; tarsi rufopiceous; wings hyaline, strongly dusky in the radial and cubital cells; venation dark brown.

Male.—Length, 11 mm. Anterior margin of the clypeus nearly straight, faintly sinuate laterally, not depressed; third antennal joint subequal with the fourth and fifth, sixth longer than the seventh; mesoscutum uniformly reticulate; otherwise as in female. Black; abdomen beyond second segment red; third, fourth, and fifth antennal joints beneath, a line following orbit from lower tubercule to clypeus, spot on malar space, spot at apex of terminal tergite, spot on apices of femora above, tibiæ externally yellow; tarsi rufo-ferruginous; wings hyaline, radial and cubital cells strongly dusky; venation dark brown.

Summerdale, California. Four females and four males collected from June 23 to July 7, 1906, by H. E. Burke on *Abies concolor*.

Type.—Cat. No. 14664, U.S.N.M.

This species is closely related to *occidentalis* Cresson, but differs in the shape of the hypopygidium. The male differs from Cresson's description in the yellow facial markings.

A female from Hoquiam, Washington, collected May 29, 1905, by H. E. Burke, probably belongs here. It has the second tergite abnormal. The foveolate suture separating the propodeum from the second tergite is broken and extends obliquely to the middle basal margin of the third tergite. This makes the propodeum triangularly produced posteriorly and reaching almost to the base of the third tergite.

ORYSSUS PINI, new species.

Female.—Length, 15 mm. Anterior margin of the clypeus rounded out, with a broad median and lateral notch; front below the ocelli and posterior orbits irregularly reticulate; postocellar line slightly longer than the intraorbital line; lateral ocelli on a line drawn between the third and fourth series of tubercules; second antennal joint less than half the length of third, third joint longer than the fourth and fifth, fifth about half the length of the fourth, seventh distinctly longer than the eighth, mesoscutum reticulate in the middle with a longitudinal raised area which has a longitudinal furrow; scutellum shining, sparsely punctured; venation strong; hypopygidium as in figure 6*f*. Black; abdomen beyond the second segment rufous; third, fourth, fifth, and basal part of sixth antennal joints beneath,

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spot on dorsal apices of femora, tibiæ exteriorly (in part) white; tarsi rufo-piceous; wings hyaline, radial and cubital cells dusky; venation black.

Meek, New Mexico. One female collected on white pine by W. F. Fiske. Under Bureau of Entomology number "Hopk. U. S. 3943."

Type.—Cat. No. 14665, U.S.N.M.

ORYSSUS RELATIVUS, new species.

Female.—Length, 14 mm. Differs from *Orys-sus pini* as described above as follows: Mesoscutum without a smooth median area which has a furrow; scutellum more closely punctured; lateral ocelli opposite the third series of tubercules. (See fig. 6*e*.)

Colorado. One female from C. F. Baker collection.

Type.—Cat. No. 14666, U.S.N.M.

ORYSSUS HOPKINSI, new species.

Male.—Length, 10.5 mm. Anterior margin of the clypeus very gently rounded out, deeply notched in the middle and with a smaller notch above the inner margin of antennæ; front below the ocelli and posterior orbits regularly reticulate; lateral ocelli situated on a line between the third and fourth series of tubercules; postocellar line subequal with the intraorbital line; third antennal joint subequal with the fourth and fifth; mesoscutum uniformly reticulate; scutellum opaque, sparsely punctured; venation strong. Black; abdominal segments beyond the second piceous, paler

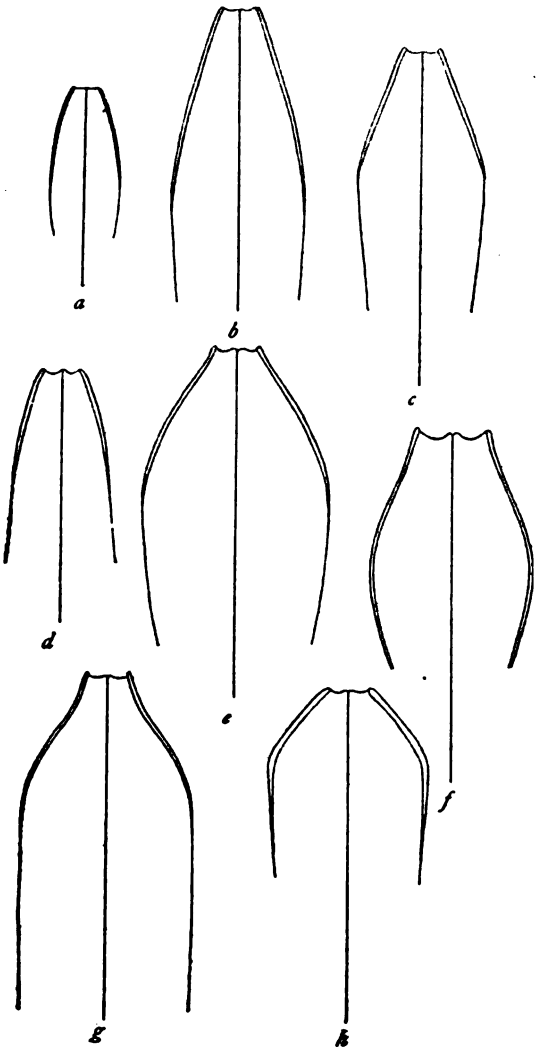

FIG. 6.—OUTLINES OF THE HYPOPYGIDIUM OF ORYSSUS. (*a*) THORACICUS; (*b*) MODESTUS; (*c*) OCCIDENTALIS; (*d*) TERMINALIS; (*e*) RELATIVUS; (*f*) PINI; (*g*) ABIETES; (*h*) HÆMORRHOIDALIS.

beneath; spot below tubercules, third, fourth, and fifth antennal joints beneath, spot on dorsal apices of femora, tibiæ exteriorly, and a spot on apical dorsal segment yellow; wings hyaline, radial and cubital cells strongly dusky; venation dark brown.

Port Angeles, Washington. One male bred from a pupa collected in an old mine of Cerambycid in the dead wood of living Douglas spruce, May 15, 1899, by A. D. Hopkins. Recorded under Bureau of Entomology number "Hopk. U. S. 141."

Type.—Cat. No. 14667, U.S.N.M.

This insect was probably killed before pigmentation was complete. It belongs to the group *occidentalis* and no doubt would have the abdomen mostly red. Can this account for the amount of red on the abdomen observed by Harrington? It appears some of his specimens were dug from their holes.

SYNOPSIS OF NEARCTIC SPECIES OF ORYSSUS.

The following synopsis includes only those species and sexes known to the writer.

Females..... 1.
Males..... 8.

1. Second antennal joint distinctly more than half as long as the third; a distinct carina behind the eyes; thorax ferruginous; length 5 mm.....*thoracicus*.
   Second antennal joint half or less than half as long as the third; no distinct carina behind the eyes although there may be an indistinct raised area; thorax black; 10 mm. or over..... 2.
2. Seventh and eighth antennal joints subequal; second antennal joint half as long as the third; abdomen black or with only the three apical segments red..... 3.
   Seventh antennal joint distinctly longer than the eighth; second antennal joint less than half as long as the third; abdomen red beyond the second segment.. 5.
3. Clypeus crenulate laterally, a tooth in the median notch, apical margin narrowly depressed; venation strong; abdomen black.....*modestus*.
   Clypeus not crenulate laterally, a narrow median notch in which there is no tooth, apical margin broadly depressed; venation weak; three apical abdominal segments red..... 4.
4. Hypopygidium sharply narrowing near the apex.....*hæmorrhoidalis*.
   Hypopygidium not sharply narrowing apically.....*terminalis*.
5. Anterior margin of the clypeus with a median notch..... 6.
   Anterior margin of the clypeus without a median notch..... 7.
6. Mesoscutum with a smooth raised area which has a longitudinal groove; lateral ocelli on a line drawn between the third and fourth tubercules.....*pini*.
   Mesoscutum without a smooth raised area and groove; lateral ocelli opposite the third tubercules.....*relativus*.
7. Hypopygidium sharply narrowed apically and then produced so as to have an apical neck.....*abietes*.
   Hypopygidium without an apical neck.....*occidentalis*.
8. Abdomen entirely black.....*sayii*.
   Abdomen in part red..... 9.
9. Clypeus without a deep median notch; inner orbits with a complete yellow line.....*abietes*.
   Clypeus with a deep median notch; inner orbits with at most a pale spot..... 10.
10. Anterior margin of the clypeus rounded anteriorly; head black.....*relativus*?
    Anterior margin of the clypeus straight; head with pale yellow spots....*hopkinsi*.

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DESCRIPTIONS OF TWO NEW ISOPODS, AN APSEUDES AND A MUNNOPSIS, BOTH FROM THE GALAPAGOS ISLANDS.

By HARRIET RICHARDSON,
Collaborator, Division of Marine Invertebrates, United States National Museum.

In 1888, during the cruise of the U. S. Bureau of Fisheries steamer *Albatross* around South America, two specimens, representing two new species of isopods belonging to different genera, were collected off Chatham Island, Galapagos Islands, at the same station and in a great depth, 812 fathoms. These species are described below. From the same locality and depth a specimen of *Arcturus* was obtained, which has been referred to *A. abyssicola* Beddard.

APSEUDES GALAPAGENSIS, new species.

Body narrow, elongate. Color white.

Head narrower anteriorly than posteriorly, with the front produced in the middle in a long slender acute rostrum, which has at the base on either side a rounded bulblike expansion; the rostrum extends forward to the middle of the basal article of the first antennæ. The shape of the rostrum is similar to that in *Apseudes spinosus* (M. Sars). On either side of the rostrum, the ocular process is produced in a long, acute spine, equal in length to the rostral spine. There are no eyes. The basal article of the first antennæ is long and narrow and extends forward; it is unarmed; the second and third articles are short and subequal and together are about half as long as the basal article; the flagellum is composed of 14 articles, the secondary filament of 6 articles. The second antennæ are slender and frail; the first article is short, about as broad as long; the second, fourth and fifth articles are subequal and each is about three times as long as the first article; the third is minute; the flagellum is composed of 7 articles. A scale is articulated to the second article. (See fig. 1.)

The first segment of the thorax is united with the head to form a carapace, as is usual in this genus. The second segment (first free segment) is produced on either side of the epimeron in a small spine, the post-lateral angle being rounded. The epimeron is produced in

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a long, acute process, extending forward on either side of the head. The third segment (second free segment) has three small spines on the lateral margin anterior to the epimeron, which is small, and one spine posterior to the epimeron. The fourth segment (third free segment) has three spines on the lateral margin anterior to the epimeron, the first being small, the two following ones long and acute, and two small spines posterior to the epimeron. The fifth segment (fourth free segment) as well as the sixth segment (fifth free segment) have each three spines on the lateral margin on either side anterior to the epimeron, the first one being small and the two following ones long and acute. The seventh or last thoracic segment (sixth free segment) has two long, acute spines anterior to the epimeron. The fifth and sixth segments (fourth and fifth free segments) are the longest and are subequal.

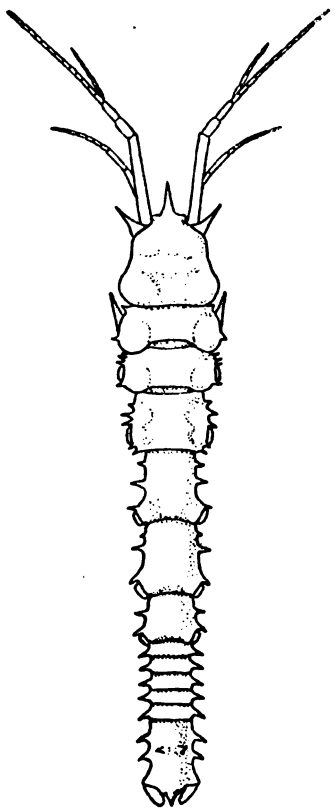

FIG. 1.—APSEUDES GALAPAGENSIS.

The first five segments of the abdomen are short and subequal and each has the lateral margin produced on either side in a long, acute process. The sixth or terminal segment is about as long as the four preceding segments taken together; it terminates in an acute point which is upturned. About the middle of the dorsal surface are two spines, one on either side of the median line. The lateral margin is produced on either side in two long, acute processes, one a little below the middle of the segment and the other a little above. The peduncle of the uropods is elongate; both branches are missing. On the ventral side of the body is a long, median spine on each of the thoracic and the first five abdominal segments.

FIG. 2.—APSEUDES GALAPAGENSIS. FIRST LEG.

The first pair of legs are chelate; they are large and strong and have the propodus furnished with a triangular process or tooth a short distance from the articulation of the dactylus with the propodus. The carpus also has a small triangular process near the proximal end. (See fig 2.) The second pair of legs are fossorial and are a little longer and stouter than any of the following, which are similar in structure

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and size. The propodus of the fossorial legs is furnished with four spines on the inner margin.

There are five pairs of double-branched pleopods, which are small and slender and rather difficult to see.

Only one specimen was collected by the U. S. Bureau of Fisheries steamer *Albatross* April 4, 1888, at station 2807, off Chatham Island, Galapagos Islands, at a depth of 812 fathoms in globigerina ooze, coral, and mud.

Type-specimen.—Cat. No. 43694, U.S.N.M.

MUNNOPSIS LONGIREMIS, new species.

Body oblong-ovate. Anterior division wider than posterior division.

Head wider than long, 3½ mm. wide, 1½ mm. long (including the rostrum). The front is produced between the basal articles of the antennæ, the anterior margin of the rostrum being straight. The first pair of antennæ have the basal article large and dilated; the second is small and short; the two following are subequal and both together about equal in length to the second; the flagellum is very long, extending to the posterior margin of the fourth thoracic segment. The second antennæ are broken at the end of the third article and the terminal parts lost. The eyes are absent. The mandibles have a 3-jointed palp, the middle article being about three times as long as either of the other two. (See fig. 3.)

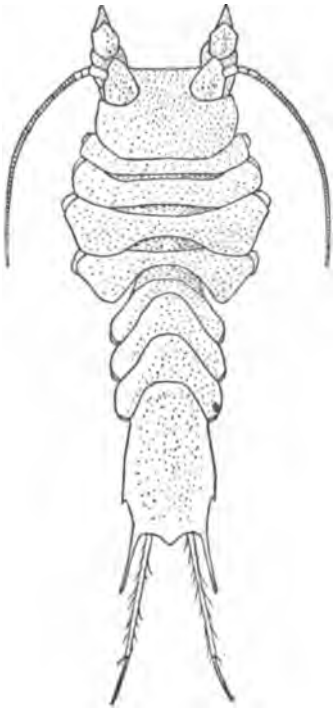

FIG. 3.—MUNNOPSIS LONGIREMIS.

The first segment of the thorax is shorter in the middle of the dorsal region than either of the two following, which are subequal. The first segment is 0.3 mm. long, the second and third each 0.5 mm. The fourth segment is short in the middle of the dorsal region (about 0.5 mm.), and is produced backward at the sides. The fifth segment is 0.5 mm. long in the middle of the dorsal region. The sixth and seventh segments are longer in the middle of the dorsal region than any of the preceding, the sixth being twice as long as the fifth (1 mm.) and the seventh a little longer than the sixth. The lateral parts of the last three segments are produced backward. All the segments are provided with epimera.

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The abdomen consists of a single large segment, which measures 4.5 mm. in length. At each post-lateral angle is a long spine, 1.5 mm. in length, produced straight backward and about two-thirds the length of the lateral margin is a small spine on either side. The posterior margin is produced in the middle in a small triangular process. The uropoda consist of a long peduncle, 3 mm. in length, or twice as long as the post-lateral spines, and a single branch which is 1.5 mm. in length.

All the legs are broken at the basis with the exception of one leg of the first pair, and this is the only one preserved (see fig. 4); it is prehensile, with 13 spines on the propodus and 5 on the merus; there is also one long spine on the carpus about the middle of the inner margin.

A single imperfect specimen, the body being in two parts, was found by the U. S. Bureau of Fisheries steamer *Albatross* at station 2807, off Chatham Island, Galapagos Islands, at a depth of 812 fathoms in globigerina ooze, coral, and mud.

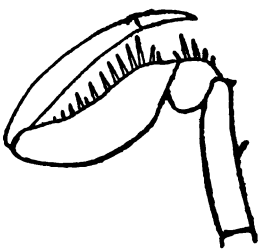

FIG. 4.—MUNNOPSIS LONGIREMIS. FIRST LEG. X 10¼.

Type-specimen.—Cat. No. 43695, U.S.N.M.

This species is very close to *Munnopsis latifrons* Beddard from off Ino Sima Island, Japan. It differs, however, from that species as described and figured by Beddard in not having the posterior margin of the terminal segment of the body truncate, but produced in a small triangular process, in having the post-lateral spines of this segment much longer than in that species and in having a greater number of spines on the propodus of the first pair of legs. The spine on the carpus is also situated halfway between the posterior and the anterior end of the article, while in *M. latifrons* it is situated closer to the anterior end.

The specimens referred by me to *M. latifrons* in 1909 differ from that species in having the posterior margin of the abdomen produced in a triangular process between the post-lateral spines, which are more divergent than in Beddard's specimens. There are also two smaller spines on the lateral margin on either side not seen in Beddard's specimens. These specimens may have to be referred to a new species.

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DESCRIPTIONS OF NEW HYMENOPTERA, NO. 5.

By J. C. CRAWFORD,
Associate Curator, Division of Insects, United States National Museum.

Many of the species herein described were received from the Bureau of Entomology, United States Department of Agriculture, having been reared by its various branches in economic investigations as parasites of injurious insects. In this connection attention is especially called to the interesting and varied series reared from *Agromyza*.

In this paper, as in all previous papers published by me, the sex first described is to be taken as the true type and the second as the allotype.

Family AGAONIDÆ.

Genus SECUNDEISENIA Schulz.

This name will replace *Eiseniella* Ashmead, which is preoccupied, a fact overlooked by me when publishing[1] the synonomy of the genus.

Family CALLIMOMIDÆ.

Genus CALLIMOME Spinola.

The type of this genus was fixed by Curtis[2] in 1835 as *Ichneumon bedeguaris* Linnæus. This same species was made the type of *Torymus* Dalman by Ashmead in 1904.

As early as 1828 Westwood had established the synonomy of these two names, although the later one has, since the time of Walker, crept into use. The correct name is here restored, and following the established custom of hymenopterologists the family name is made to conform with that of the oldest included genus.

PODAGRION ECHTHRUS, new species.

Female.—Length about 4 mm.; ovipositor about 5 mm. Head and thorax green, with some bluish tints; face with very fine crowded punctures, appearing almost granular; scape flavous; pedicel and ring joint light brown, rest of antennæ darker brown; first joint of funicle

[1] Proc. U. S. Nat. Mus., vol. 42, 1912, p. 3.

[2] Brit. Ent., vol. 12, p. 552.

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somewhat longer than the pedicel; club of antennæ not thickened, but the joints coalesced; thoracic notum with crowded punctures, those on the propodeum thimble-like, those on the pronotum and anterior part of mesoscutum appearing more like reticulations; scutellum toward apex finely lineolate, followed by a row of pits and a smooth margin; propodeum with two carinæ starting from the middle of the base and diverging to touch points just back of the insertion of the hind coxæ; starting at almost the middle of each of these carinæ another carina extends to the side of the arcuate opening from which the petiole projects; propodeum at apex medially with a few rugulæ and a few on the cephalic side of the points of joining of the two pairs of carinæ; wings subhyaline, postmarginal vein almost twice as long as the stigmal; front and middle legs, including coxæ, flavous; hind coxæ about as long as the hind femora, bluish, with flavous tips; rest of hind legs flavous, with a bluish spot on disks of femora on outer sides and a smaller brown spot on the inner sides; hind femora with about five or six dark brown teeth (three apical ones large, then one or two small ones, and then a large one basad) (see fig. 1); abdomen above bluish purple with a medial brown spot, below flavous.

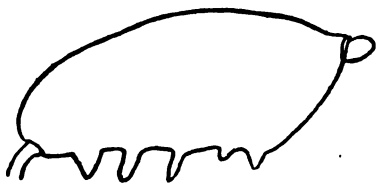

FIG. 1.—PODAGRION ECHTHRUS. HIND FEMUR OF FEMALE.

Male.—Length about 3.5 mm. Similar to the female; the antennæ flavous, with the club somewhat dusky; the hind femora with the green spot on the outer side covering most of the disk, the brown spot inwardly almost as large; hind tibiæ dark brown; hind femora with three large teeth and basad of them a dentiform angle. (See fig. 2.)

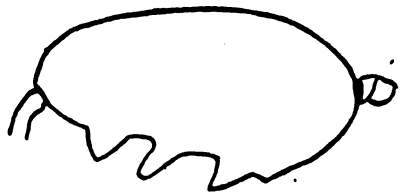

FIG. 2.—PODAGRION ECHTHRUS. HIND FEMUR OF MALE.

Habitat.—Santa Lucrecia, Vera Cruz, Mexico.

Described from specimens from a large series reared by Mr. F. W. Urich from the eggs of *Mantis*, species.

Type.—Cat. No. 14811, U.S.N.M.

Family EURYTOMIDÆ.

EURYTOMA PIURÆ, new species.

Female.—Length about 2.5 mm. Black, the head and thorax closely umbilicately punctured; pedicel short, hardly longer than broad; first joint of funicle about twice as long as pedicel, the following joints successively decreasing in length; club about as long as the last

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two joints of the funicle combined; pronotum about twice as broad as long, about as long as the mesoscutum; punctures of mesoscutum and axillæ finer than those on scutellum; propodeum coarsely rugose, with a well defined median channel, this channel divided by a median carina and transverse rugæ, making it appear more or less distinctly to be composed of two vertical rows of pits; mesopleuræ longitudinally, finely, closely carinate and punctured between the carinæ; marginal and postmarginal veins subequal in length, the stigmal vein somewhat shorter; coxæ and femora, except tips, black; tibiæ reddish testaceous, tarsi whitish; abdomen smooth, polished, the segments punctured along the lower margins; segments 1–3 short, segment 4 about as long as 1–3 combined; following segments short.

Male.—Length about 2 mm. Similar to the female except in secondary sexual characters; the tibiæ medially largely black; the petiole about as long as the hind coxæ.

Habitat.—Piura, Peru.

Five female and three male specimens from Prof. C. H. T. Townsend, the types and two other females and one male with the record, reared from a lot of cotton squares containing *Anthonomus vestitus;* the other specimens with the record, reared from *A. vestitus.*

Type.—Cat. No. 14614, U.S.N.M.

Family CLEONYMIDÆ.

CHEIROPACHUS BRUNNERI, new species.

Female.—Length about 3.5 mm. Green, tinged with brassy; the clypeus finely vertically rugulose, face with thimble-like punctures, along inner orbits interspersed with larger setigerous punctures, making the face appear rugoso-punctate; along upper ends of inner orbits the punctures change to shallow reticulations; scape reddish-testaceous, rest of antennæ brown; first joint of funicle slightly but distinctly longer than pedicel; thoracic tergum and anterior half of mesopleuræ with thimble-like punctures; propodeum with a median carina, the sculpture between the lateral folds resembling shallow, rather indistinct, thimble-like punctures; wings with a fuscous cloud at apex of submarginal vein and another extending from the base of the postmarginal vein almost to its apex; this latter reaching apex of stigmal vein and extending backward about half way across wing, marginal and postmarginal veins subequal in length, the stigmal slightly shorter; front and middle femora brown tinged with metallic greenish behind, hind femora green; tibiæ lighter brown than femora; tarsi testaceous.

Male.—Length about 3.5 mm. Very similar to the female except in secondary sexual characters; the propodeum with thimble-like punctures.

Habitat.—Columbia Falls, Montana.

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Type.—Cat. No. 14583, U.S.N.M.

Material received from the Bureau of Entomology, United States Department of Agriculture, under note number, Hopkins U. S. No. 8574, Josef Brunner, collector; reared from *Pissodes*, species.

Paratypes in the male sex show the propodeum as in the type female.

This species differs from *C. colon* and allies in the coarse sculpture of the face and in the punctures of the metanotum.

The species is named after the collector.

Family ENCYRTIDÆ.

Tribe EUPELMINI.

CERAMBYCOBIUS TOWNSENDI, new species.

Female.—Length about 4 mm.; sheaths of ovipositor exposed about 1 mm. Head and thorax bronzy, in places somewhat greenish; abdomen more aeneous; scape reddish-testaceous, rest of antennæ dark brown; pedicel about as long as the first joint of the funicle; lower half of face rugoso-punctate, the upper part lineolate; above anterior ocellus becoming closer and transverse; lateral ocelli less than their own width from eyes and slightly farther from each other than from the anterior ocellus; median lobe of mesoscutum transversely rugulose, back of this reticulated with fine raised lines; lateral lobes along elevations very finely reticulated, the outer part almost as coarsely reticulated as the median area of the mesoscutum; axillæ and scutellum finely reticulated; postmarginal vein about as long as the stigmal, about one-fourth as long as the marginal; legs rufo-testaceous, the coxæ and the anterior and posterior femora except tips metallic greenish; tarsi whitish; abdomen finely reticulated; segments 1–4 deeply incised medially, segment 5 rounded at apex; sheaths of ovipositor with a median white band.

Male.—Length about 2.5 mm. Blue-green with some bronzy reflections; in sculpture largely similar to the female, but with the face below with thimble-like punctured; above antennal fossa finely reticulated; antennæ entirely dark, the scape and pedicel blue green; first joint of funicle longer than pedicel; median lobe of mesoscutum at rear with sculpture like that of female; rest of mesoscutum rugulose, the rugulæ more or less transverse; legs blue-green, the anterior tibiæ and all the tarsi testaceous.

Habitat.—Department of Piura, Peru.

Host.—Anthonomus vestitus.

Type.—Cat. No. 14615, U.S.N.M.

Type female reared from cotton squares; allotype male reared from the Peruvian cotton-square weevil, *Anthonomus vestitus*, by Prof. C. H. T. Townsend and sent under his number 795° 3d[3]. Paratypes from

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the same region, both reared from the host weevil and others recorded as issuing from cotton squares.

In general this species resembles *C. cushmani* of the United States, but that species has the anterior femora light colored.

CERAMBYCOBIUS PERUVIANUS, new species.

Female.—Length about 3.5 mm.; sheaths of ovipositor exposed about 0.25 mm. Head and thorax green tinged with bronzy; abdomen aeneous, the base green; lower part of face rugulose, above antennal fossa with shallow crowded punctures, back of ocellar triangle finely rugulose, on rear of head the rugulæ becoming transverse; lateral ocelli slightly closer to each other than to anterior ocellus; scape and basal joints of funicle bronzy, rest of antennæ dark brown; mesoscutum very finely and indistinctly lineolate and with sparse minute setigerous punctures; axillæ more coarsely and distinctly lineolate, scutellum with the lineolation reticulated; prepectus reticulated with fine raised lines; mesopleuræ with similar, but finer sculpture; wings hyaline, the postmarginal vein only slightly longer than the stigmal; coxæ greenish; front legs reddish-testaceous, the femora with a green stripe outwardly; middle legs similar in color but the femora and tibiæ dusky medially and the tarsi more whitish; hind femora, except bases and apices, green; hind tibiæ medially dark brown, hind tarsi except the darkened tips whitish, rest of hind legs testaceous; abdomen finely lineolated, the lineolations closer toward apex; segments 1–3 deeply incised medially at apex, segment 4 notched medially, segment 5 broadly emarginate; sheaths of ovipositor not banded.

Male.—Unknown.

Habitat.—Department of Piura, Peru..

Type.—Cat. No. 14597, U.S.N.M.

One specimen reared by Prof. C. H. T. Townsend from a lot of cotton squares.

Tribe MIRINI.

COCCIDOCTONUS, new genus.

Mandibles three-toothed, head viewed laterally triangular, the front strongly projecting; eyes hairy, prominent, converging to point where front is most prominent and inner orbits parallel from there to back of ocelli; in the female the lateral ocelli touch inner orbits and are separated from each other by about one and one-half times the diameter of an ocellus; lateral ocelli nearer to each other than to the anterior ocellus; front ocellus in diameter about one-third the distance between the eyes at its point of insertion; in the male the front slightly wider, the lateral ocelli touching the orbits, the ocelli in an equilateral triangle, the lateral ocelli separated from each other by about twice the diameter of an ocellus; in the female the funicle six-

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jointed, the joints elongate, club three-jointed, enlarged, about as long as the last three joints of the funicle together; in the male, funicle six-jointed, joints elongate, club not enlarged; axillæ meeting medially; wings hyaline, the marginal vein almost punctiform, the stigmal vein longer, the postmarginal vein longer than the stigmal; ovipositor about as long as the abdomen.

Type of the genus.—*Coccidoctonus trinidadensis* Crawford.

In Doctor Ashmead's classification this genus goes to *Zaomma*, from which it differs in the long antennæ, in the joints of the funicle being elongate, in the less enlarged club which is not as long as the funicle and in the prominent ovipositor.

COCCIDOCTONUS TRINIDADENSIS, new species.

Female.—Length about 1.12 mm.; ovipositor about 0.5 mm. Head and mesoscutum dark green, scutellum bronzy aeneous; abdomen aeneous; front very delicately and finely reticulately lineolated and with a very few scattered punctures; lower part of face minutely rugulose; antennæ flavous, above, somewhat infuscated; pedicel as long as joints one and two of funicle combined; joint one of funicle slightly longer than wide, shorter than second joint; following joints subequal in length; hair on eyes short, inconspicuous; mesoscutum and scutellum finely lineolated, the mesoscutum transversely so; legs, including coxæ, yellowish, the tibiæ with a brown spot outwardly near base, that on the middle tibiæ the most conspicuous; femora outwardly somewhat infuscated.

Male.—Length about 0.85 mm. Similar to the female, the sculpture of the front deeper, resembling shallow, crowded punctures; antennæ with thick long hair; hair on eyes more conspicuous than in female.

Type-locality.—Port of Spain, Trinidad.

Reared from *Pulvinaria pyriformis* on honeysuckle by Mr. Lachmere-Guppy.

Type.—Cat. No. 14760, U.S.N.M.

Family PTEROMALIDÆ.

SPINTHERUS PULCHRIPENNIS, new species.

Female.—Length about 4 mm. Head and thorax blue with purplish tints, the abdomen brown, with the base blue; face with fine crowded punctures, appearing almost granular; mandibles 3-toothed; antennæ brown, the scape testaceous, pedicel elongate, about as long as the first joint of the funicle; first ring joint almost subquadrate, the second longer than broad; thoracic notum with fine thimble-like punctures; scutellum near apex with a transverse line due to the apical portion having larger punctures; propodeum short, without a neck, with a median carina, lateral folds shallow, the area between them with very shallow indistinct punctures; prepectus and meso-

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pleuræ entirely covered with thimble-like punctures; legs rufo-testaceous the femora more or less infuscated; front and middle coxæ with a large blue spot at base; hind coxæ entirely bluish; femora more or less tinged with bluish behind; wings hyaline with a large fuscous band the length of and covering the marginal vein and extending about two-thirds across wing; the anterior part much more deeply infuscated than the posterior; marginal vein slightly shorter than stigmal (about as 15:18) and slightly thickened; postmarginal much longer than marginal (about 25:15).

Male.—Unknown.

Habitat.—Columbia Falls, Montana.

Host.—*Pissodes*, species.

Type.—Cat. No. 14596, U.S N.M.

Described from specimens received from the Bureau of Entomology, United States Department of Agriculture, under note number, Hopkins U. S. No. 8574 (a single specimen, the type) and 8573 (all paratypes), collected by Josef Brunner.

Genus CECIDOSTIBA Thomson.

The American species do not appear to fit well in this genus, as one at least (*C. thomsoni*) has both mandibles with three teeth, and Thomson characterized this genus, *Cænacis* Thomson and *Dinotus* Foerster (all of which have the stigmal knob enlarged) as having the right mandible four-toothed and the left three-toothed. There is in the collection a specimen congeneric with *C. thomsoni* determined as *Dinotus* species by Dr. Gustav Mayr and obtained by Dr. L. O. Howard for the purpose of ascertaining the number of teeth on the mandibles, and this specimen has both mandibles three-toothed. This illustrates the unsettled condition of this group and for this reason the species are allowed to remain in this genus for the present.

Doctor Ashmead, when describing *C. dendroctoni*, labeled all the material examined "type," but deposited one female in the collections of the U. S. National Museum and gave it a type-number. This specimen (see particulars below) has been accepted as the true type and the remainder of the material, representing in part another species, has been used in the description of one of the new species given below.

TABLE OF FEMALES OF SPECIES FOUND IN THE UNITED STATES.

1. Mesopleuræ without a large subtriangular smooth area on upper half of mesepimenon ..... 2.
   Mesopleuræ with a large subtriangular smooth area on upper half of mesepimeron. 3.
2. Marginal and postmarginal veins subequal in length..... *dendroctoni* Ashmead.
   Postmarginal vein almost one-half longer than marginal..... *burkei* Crawford.
3. First joint of funicle and pedicel subequal in length..... *polygraphi* Ashmead.
   First joint of funicle distinctly longer than pedicel..... 4.
4. Prepectus covered with thimblelike punctures..... *ashmeadi* Crawford.
   Prepectus almost entirely without thimblelike punctures..... *thomsoni* Crawford.

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CECIDOSTIBA DENDROCTONI Ashmead.

The type-specimen bears the data, Hopkins, W. Va., accession No. 6359*b*, and was reared from *Dendroctonus frontalis*.

Type.—Cat. No. 2180, U.S.N.M.

CECIDOSTIBA BURKEI, new species.

Female.—Length about 7 mm. Head and thorax bronzy green, abdomen aeneous, slightly tinged with greenish; face below insertion of antennæ rugoso-punctate; above insertion of antennæ with thimblelike punctures; clypeus and supraclypeal area with finer sculpture than sides of face; scape rufous, rest of antennæ dark brown, joints of funicle elongate, the first about three times as long as the pedicel, first joint of club as long as last two combined; thoracic notum, propodeum between lateral folds, and pleuræ, including prepectus, with thimblelike punctures; upper half of mesepimeron reticulated, the anterior margin very finely so; propodeum with a median carina; wings slightly dusky, marginal vein shorter than postmarginal (about as 25:35), but longer than stigmal (about as 25:20); coxæ and front and hind femora, except bases and apices, green; middle femora brown, rest of legs reddish testaceous; abdomen elongate, last dorsal segment about one and one-half times as long as penultimate.

Male.—Unknown.

Type.—Cat. No. 14580, U.S.N.M.

One specimen from Hoquiam, Washington, with the data, crawling on *Picea sitchensis* (with the date 6–7–04), H. E. Burke, collector. Received for name from Dr. A. D. Hopkins, in charge of Forest Insect Investigations, Bureau of Entomology, United States Department of Agriculture.

This species is named after the collector.

CECIDOSTIBA ASHMEADI, new species.

Female.—Length 4.5 mm. Green, head and thorax above with thimblelike punctures, those on the clypeus and supraclypeal areas finer; back of head from a short distance back of lateral ocelli, semicircularly striate; scape and pedicel yellowish, rest of antennæ brown, the first joint of the funicle almost one and a half times as long as the pedicel; metanotum medially visible; propodeum between the lateral folds with thimblelike punctures and without a distinct median carina; prepectus and mesopleuræ with thimblelike punctures; the upper half of the mesepimeron smooth; postmarginal vein over one and a half times as long as the marginal; stigmal shorter than marginal; coxæ green, femora, except tips, brown with more or less metallic luster, especially on front and hind femora, middle

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femora in front, tips of all femora and rest of legs testaceous; abdomen longer than the head and thorax combined.

Male.—Unknown.

Type-locality.—Morgantown, West Virginia.

Type.—Cat. No. 14581, U.S.N.M.

Described from two specimens; as noted above, the type is one of the series of specimens labelled as "type" of *C. dendroctoni* by Doctor Ashmead, and has the record Hopkins, W. Va., No. 4555, and the note shows it to be a parasite of *Polygraphus rufipennis*; the paratype from the same locality also labeled "type" of *C. dendroctoni*, has the record Hopkins, W. Va., No. 5762.

CECIDOSTIBA THOMSONI, new species.

Female.—Length about 4.5 mm. Brilliant green, the mesonotum somewhat bronzy; head and mesonotum, together with pleuræ, with thimble-like punctures; lower part of face rugoso-punctate, clypeus separated from face by a depressed line; back of head from a point not far back of ocelli, semicircularly striate; scape reddish, pedicel slightly darker, rest of antennæ dark brown, first joint of funicle distinctly longer than pedicel, the following joints successively decreasing in length, the last subquadrate; apical part of scutellum more coarsely punctured than basal, the line of joining abrupt, distinct; metanotum medially concealed by the apex of the scutellum; propodeum without a neck, with distinct lateral folds, medially finely rugose, laterad of this as far as the folds, punctured; the extreme apex with a few coarse rugæ; laterad of the folds the surface almost smooth, with a few weak wrinkles; spiracles small, oval; upper part of mesepimeron in the shape of a triangle impunctured, metapleuræ finely rugulose; wings almost hyaline, marginal vein shorter than postmarginal (about as 20 : 35); stigmal (including knob) slightly shorter than marginal; stigmal knob about one-third the total length of vein, surrounded by a small infuscated band; coxæ green, trochanters, all femora at bases and apices, tibiæ and tarsi, yellowish; front femora, except a brown stripe on front, green; middle femora brown with a green stripe beneath, hind femora green outside, inside deep brown; abdomen elongate, finely reticulately lineolated, last dorsal segment about as long as penultimate.

Male.—Length about 3.25 mm. Similar to the female; front and middle legs almost entirely reddish-testaceous, the front femora slightly infuscated, hind femora green outwardly, inside fuscous; abdomen æneous, the base and apex greenish, near base with a large testaceous spot; propodeum longer than in female, and with a median carina.

Habitat.—Columbia Falls, Montana.

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Host.—*Pissodes*, species.

Type.—Cat. No. 14582, U.S.N.M.

Described from six female and six male specimens selected from a large series under Bureau of Entomology, United States Department of Agriculture, note number, Hopkins U. S. No. 8574, Josef Brunner, collector.

In some males the rugæ between the lateral folds on the propodeum are, except for the median carina, replaced by punctures.

An examination of the mandibles of a female shows each to have three teeth.

This species is named in honor of Mr. C. G. Thomson, whose excellent monograph of the chalcids of Scandavia began a new era in the study of this group.

SCYMNOPHAGUS SECUNDUS, new species.

Female.—Length about 1.85 mm. Head and thorax dull pitchy-black, the propodeum more or less greenish, the abdomen distinctly so; antennæ brown, the scape lighter, the three ring-joints distinct; pedicel about as long as the first joint of the funicle; joints of funicle subequal in length; head and thorax with thimblelike punctures, scutellum with a well-marked transverse furrow; propodeum with sculpture similar to that of mesonotum but finer, and laterad of the lateral folds much weaker, this sculpture not extending laterad of the spiracles; propodeum with no median carina; coxæ black, femora except tips, brown, rest of legs brownish testaceous.

Male.—Unknown.

Habitat.—Palissa, Bukedi, Uganda.

Type (and two paratypes).—In British Museum (Natural History).

Paratypes.—Cat. No. 14584, U.S.N.M.

Described from specimens with the data reared from an unknown coleopterous larva collected by Mr. G. C. Gowdey, under No. 2171 with the date 1.XII,1910 and the additional note that the larva so greatly resembled a coccid that at first sight it was taken for one.

This larva was probably a *Scymnus* or closely allied coccinellid genus.

The above-described species greatly resembles *S. townsendi* Ashmead, but the more distinctly differentiated furrow of the scutellum and the less distinct sculpture of the propodeum laterad of the lateral folds distinguish the two species.

CATOLACCUS TOWNSENDI, new species.

Female.—Length about 4 mm. Very similar in color and general appearance to *C. hunteri*, the venation and antennal characters being about the same; sculpture of face medially weaker than in *hunteri* and composed almost entirely of vertical striæ instead of reticula-

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tions; below with striæ converging toward mouth; antennæ brown, the scape and pedicel testaceous; sculpture of postvertex medially less reticulate than *hunteri;* mesonotum with thimble-like punctures on the disk and outer margins of lateral lobes becoming rugulose; propodeum finely reticulately lineolated, with a median carina and a transverse fold, the lateral folds not very distinct; legs dark brown, the trochanters, knees, tibiæ, and tarsi testaceous; abdomen longer than head and thorax combined, slender.

Male.—Length about 2.5 mm. Very similar to the female, the sculpture of the face stronger and more pronouncedly vertical; sculpture of propodeum somewhat stronger than in female; abdomen with a large basal whitish spot.

Habitat.—Department of Piura, Peru.

Host.—*Anthonomus vestitus.*

Type.—Cat. No. 14613, U.S.N.M.

The type female reared from the above host and sent by Prof. C. H. T. Townsend under his number 795° 3e; the male reared from cotton squares. Several paratypes reared from the host and others with the record that they issued from cotton squares.

This species is easily distinguished from *C. hunteri* by the sculpture of the face, the postvertex, the lateral lobes of the mesoscutum and of the propodeum.

Family EULOPHIDÆ.

Subfamily ENTEDONINÆ.

A thorough revision of the genera of this subfamily from the standpoint of the genotypes is greatly needed. The confusion in which the genera still exist may be well illustrated by referring to the species assigned below to the genus *Pleurotropis.* These are strictly congeneric, but were described in various genera and for the most part left in the genera in which they were originally described. A notable exception to this is the species (*Asecodes*) *Pleurotropis albitarsis* Ashmead, which Doctor Ashmead had placed in the collections in the genera *Asecodes, Entedon, Mestocharis,* and *Pleurotropis.*

Until such a revision is made species must be arbitrarily assigned to the genera to which they appear to belong or new genera described for them. Since the latter procedure seems unnecessary the former is here adopted in the assignment of the species placed in *Derostenus* (in this case for additional reasons discussed under the remarks on that genus) and in *Chrysocharis.*

CHRYSOCHARIS PARKSI, new species.

Female.—Length about 1.25 mm. Green with brassy tints, the lower part of the face bronzy; face below transverse furrow reticulated; area surrounding ocelli very faintly reticulated; vertex sharply carinate; scape in front, except apex, whitish; funicle three-jointed,

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joints two and three subequal in length, each about as long as the pedicel, the first distinctly longer; club showing only two joints and the apical spine; mesoscutum and scutellum reticulated, at the sides and apex of the scutellum the reticulations becoming elongate; metanotum at apex bounded by a carina, the disk rugose; propodeum medially with a carina which anteriorly divides; lateral folds present not very distinct; the area between them finely, almost reticulately, rugulose; wings hyaline, the stigmal knob elongate, subsessile; the postmarginal vein about twice as long as the stigmal; legs white, coxæ æneous; petiole as long as the hind coxæ, viewed laterally the apical half abruptly thickened; from above medially suddenly widened and with a spine on each side; thickened part irregularly rugulose; abdomen ovate, short.

Male.—Length about 1.25 mm. Similar to the female except for secondary sexual characters, but the scape swollen, funicle with longer, more abundant hair, the joints more elongate; sculpture of face stronger.

Type-locality.—Salt Lake City, Utah.

The type female and the allotype male received from the Bureau of Entomology, United States Department of Agriculture, under Webster note number 6639 (for the female) and 7485 (for the male), T. H. Parks collector.

Four paratypes from the same source and locality under Webster number 6639, with the additional data, reared from *Agromyza*, C. N. Ainslie collector; three paratypes, same locality and number, T. H. Parks collector.

The species is named after the collector of the types.

Type.—Cat. No. 14791, U.S.N.M.

CHRYSOCHARIS AINSLIEI, new species.

Female.—Length about 1.25 mm. Blue green with the scutellum bronzy; face below the transverse furrow distinctly reticulated, above, less distinctly so; scape aeneous, rest of antennæ brown; first joint of funicle longer than the pedicel, hardly longer than the second joint, the third joint slightly shorter; club showing two joints and the apical spine; mesonotum reticulated, the reticulations on the sides of the scutellum elongate; metanotum apically bounded by a carina, faintly sculptured; propodeum with faint lateral folds, the area between them finely rugulose; wings hyaline; coxæ, trochanters, except apices, femora, except apices, aeneous; rest of legs whitish; petiole about as in the above species.

Male.—Length about 1.12 mm. Similar to the female except in secondary sexual characters.

Type-locality.—Salt Lake City, Utah.

Specimens received from the Bureau of Entomology, United States Department of Agriculture, under Webster note number 6639, the type

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female with the additional data, reared from *Agromyza* pupa, the allotype male with the record, reared from *Agromyza;* paratypes, some with each of the above records.

The species is named after the collector, C. N. Ainslie.

Type.—Cat. No. 14792, U.S.N.M.

Genus CLOSTEROCERUS Westwood.

TABLE OF FEMALES OCCURRING IN THE UNITED STATES.

1. Wings trifasciate..... 3.
   Wings bifasciate..... 2.
2. Mesonotum green.....*cinctipennis* Ashmead.
   Entire insect brilliant purple or bluish.....*utahensis* Crawford.
3. Head laterad of ocelli smooth, polished.....*winnemanæ* Crawford.
   Head laterad of ocelli distinctly sculptured..... 4.
4. Mesonotum without a median black longitudinal stripe; punctures back of ocelli strong, thimble-like; punctures of parapsides as large as those on median area *trifasciatus* Westwood.
   Mesonotum with a median longitudinal black stripe; punctures back of ocelli crowded but not thimble-like; punctures along inner edges of parapsides smaller and more indistinct than those on disk.....*tricinctus* Ashmead.

CLOSTEROCERUS TRIFASCIATUS Westwood.

This European species has been recorded from the United States and is therefore included in the table. I have seen no specimens of it, all those seen being instead *C. tricinctus* Ashmead.

CLOSTEROCERUS TRICINCTUS Ashmead.

Pleurotropis tricinctus ASHMEAD., Bull. No. 3, Kansas State Agr. Coll., Appendix p. VIII, 1888.

CLOSTEROCERUS UTAHENSIS, new species.

Female.—Length about 0.75 mm. Brilliant purple or bluish-purple, with a few greenish tints on mesoscutum and the propodeum greenish; head around ocelli and mesonotum with crowded shallow punctures, those on back of head becoming somewhat transverse; metanotum narrow, smooth; propodeum smooth; wings with a dark band at the stigmal vein and one at apex; legs dark, the anterior and middle tibiæ on apical half, together with the tarsi, light.

Male.—Unknown.

Type-locality.—Salt Lake City, Utah.

Specimens received from the Bureau of Entomology, United States Department of Agriculture, under Webster note number 6639, with the additional record, C. N. Ainslie, collector, reared from *Agromyza.*

Compared with a broken specimen named by Doctor Ashmead as *C. cinctipennis,* this species is less robust and has the mesoscutum more finely punctured, in addition to the color differences

Type.—Cat. No. 14788, U.S.N.M.

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CLOSTEROCERUS WINNEMANÆ, new species.

Female.—Length about 1.12 mm. Varying shades of purple and blue, with the head above largely greenish and some greenish tints on the mesothorax; mesonotum with a broad medial longitudinal black stripe bordered on each side by a narrow stripe of green; head laterad of the ocelli polished, almost nonsculptured (the highest power of the binocular microscope showing a small area of indistinct reticulations); mesonotum with crowded punctures, medially coarser and resembling reticulations; inner half of parapsidal areas transversely rugulose; punctures laterad on scutellum much finer than those mesad; metanotum and propodeum smooth, the former distinctly shorter than the propodeum, which has no trace of a neck; wings trifasciate, one band at the apex of the wings, one at the stigmal vein and the third about half way between the base and apex of the marginal vein; legs brownish with a purplish luster; the apical half of the anterior tibiæ and all tarsi, except apices, whitish; abdomen black with the lateral margins broadly purple.

Male.—Length about 1.0 mm. Similar to the female, but the mesonotum largely greenish and the median black stripe replaced by a narrower brownish one.

Type-locality.—Plummer's Island, Maryland.

Reared from the eggs of *Arge salicis* Rohwer, together with *Winnemana argei* Crawford.

In having a median black stripe on the mesoscutum this species resembles *C. tricinctus* Ashmead, but that species has the propodeum with a short but distinct neck defined by a carina at each side, the metanotum delicately but distinctly sculptured, and fully as long as the propodeum from the base to the beginning of the carinæ which bound the neck of the propodeum.

Type.—Cat. No. 14787, U.S.N.M.

HORISMENUS URICHI, new species.

Female.—Length about 1.5 mm. Very dark blue-green, the mesonotum in certain lights appearing aeneous; face below V-shaped furrow with thimblelike punctures; above it with two lines of similar shallower punctures extending upward as far as the anterior ocellus; between these two lines of punctures and laterad of them the face smooth; ocellar triangle finely reticulated; scape white, rest of antennæ, green; pedicel about as long as first joint of the funicle; the following joints of the funicle slightly shorter than the first, subquadrate; mesoscutum delicately reticulated; scutellum on basal two-thirds with similar indistinct sculpture; lateral grooves on scutellum not extending mesad at rear, their caudal ends widely separated; medial furrow not quite reaching apex of scutellum; propodeum except extreme apex and the depressions on each side of median

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elevation, smooth, polished; medial area of propodeum slightly wider than the depressions on either side of it; prepectus closely punctured; mesopleurae smooth; legs white, the coxae blue-green; apical half of first abdominal segment, except apical margin, finely reticulated with impressed lines.

Male.—Length about 1.25. Similar to the female except in secondary sexual characters; the petiole as long as the hind coxae.

Habitat.—Santa Lucrecia, Vera Cruz, Mexico.

Host.—*Cirphis humidicola.*

Type.—Cat. No. 14810, U.S.N.M.

Described from specimens from a large bred by Mr. F. W. Urich, after whom the species is named.

In some of the paratypes the sculpture of the scutellum is absent except basally and laterad and in the male the reticulated area of the first abdominal segment is greatly reduced and the sculpture weakened.

In my table of the species of the genus from the West Indies [1] this runs to *nigroaeneus* Ashmead, which has the whole front above the transverse furrow sculptured; the sculpture of the mesoscutum much stronger, consisting of well elevated carinae, the sculpture of the scutellum more distinct, etc.

In Doctor Ashmead's table the South American species,[2] it runs to *aeneicollis* Ashmead, which has the sculpture of the face below the transverse furrow resembling reticulations, above the furrow with delicate, indistinct reticulations; the lateral carinae of the scutellum apically curve inward and meet the median carina, etc.

Genus PLEUROTROPIS Foerster.

In this genus are placed species of the tribe *Entedonini* which have, as I understand them, the characters assigned to the genus by Foerster. The propodeum has two longitudinal medial carinae which at the apex of the propodeum turn laterad; also between the spiracles and these carinae, at about the point usually occupied by the lateral folds. another longitudinal carina.

The species found in the United States which answer the above characters have been described in so many genera that a table of them is given and also their synonomy. *Pleurotropis leucopis* Ashmead has only one medial carina and no lateral carinae and is therefore excluded.

TABLE OF FEMALES KNOWN FROM THE UNITED STATES.

1. Scutellum smooth medially.....2.
   Scutellum medially sculptured.....3.
2. Head of female coppery; of male green; funicle male three-jointed, club apparently two-jointed.....*quercicola* Ashmead.
   Head green.....*tarsalis* Ashmead and *ashmeadi* Crawford.

[1] Proc. U. S. Nat. Mus., vol. 40, 1911, p. 446.

[2] Memoirs Carnegie Museum, vol. 1, No. 4, 1904, p. 507.

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3. Face in front of ocelli smooth.....4.
Face in front of ocelli punctured or reticulate.....6.
4. Face below transverse furrow reticulated.....*niger* Ashmead.
Face below transverse furrow smooth.....5.
5. Green, posterior ends of parapsidal furrows not foveate, sculptured.
phyllotretæ Riley.
Bronzy; posterior ends of parapsidæ furrows replaced by scar-like foveæ, smooth.
splendens Cook and Davis.
6. Median lobe of mesoscutum at rear with two smooth foveæ.....7.
Median lobe of mesoscutum at rear either not bifoveate or the foveæ sculptured..8.
7. First joint of funicle longer than pedicel; sculpture above transverse furrow on face, in front of ocelli extending laterad to eyes.....*lithocolletidis* Ashmead.
First joint of funicle no longer than pedicel; sculpture in front of ocelli and above transverse furrow, not extending laterad to eyes.....*albitarsis* Ashmead.
8. Mesoscutum shallowly bifoveate, the sculpture of the mesoscutum delicate; scutellum delicately longitudinally rugulose but with enough transverse rugulæ to appear subreticulate; vertex in front of ocelli transversely subreticulate.
wilderi Howard.
Sculpture of head in front of ocelli, of mesoscutum and scutellum consisting of thimble-like punctures.....*rugosithorax* Crawford.

PLEUROTROPIS QUERCICOLA Ashmead.

Asecodes quercicola Ashmead, Bull. No. 3, Kansas State Agric. Coll., Appendix, p. viii, 1888.

This species is placed in the table from the description, as the colection contains only a type male.

PLEUROTROPIS TARSALIS Ashmead.

Holcopelte tarsalis Ashmead, Trans. Amer. Ent. Soc., vol. 21, 1894, p. 341.

PLEUROTROPIS ASHMEADI, new name.

Asecodes albitarsis Ashmead, Can. Ent., vol. 20, 1888, p. 103. [Not (*Entedon*) *Pleurotropis albitarsis* Ashmead.]

As the type of this species is not available, the interpretation here adopted is that of Doctor Howard in A Study of Insect Parasitism.[1]

Although no satisfactory means have been found for distinguishing the females of *tarsalis* and *ashmeadi*, the males may be separated as follows: Funicle apparently four-jointed, club one-jointed, *tarsalis;* funicle apparently three-jointed, club two-jointed, *ashmeadi*.

PLEUROTROPIS PHYLLOTRETÆ Riley.

Pleurotropis phyllotretæ Riley, Report U. S. Dept. Agr. for 1884, 1884, p. 307.

PLEUROTROPIS SPLENDENS Cook and Davis.

Derostenus splendens Cook and Davis, Bull. 73, Mich. Agr. Exp. Sta., p. 13, 1891, fig. 9.

PLEUROTROPIS NIGER Ashmead.

Closterocerus niger Ashmead, Trans. Amer. Ent. Soc., vol. 23, 1896, p. 232.

[1] Bull. 5, Tech. Ser., U. S. Department of Agriculture, Division of Entomology.

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PLEUROTROPIS LITHOCOLLETIDIS Ashmead.

Entedon lithocolletidis ASHMEAD, Bull. No. 3, Kansas State Agr. Coll., Appendix p. VIII, 1888.

PLEUROTROPIS ALBITARSIS Ashmead.

Entedon albitarsis ASHMEAD, Can. Ent., vol. 20, 1888, p. 102.

PLEUROTROPIS WILDERI Howard.

Mestocharis wilderi HOWARD, Proc. Ent. Soc. Wash., vol. 2, 1892, p. 298.

PLEUROTROPIS RUGOSITHORAX, new species.

Female.—Length about 1.5 mm. Deep bluish, the head aeneous; face both above and below V-shaped furrow reticulated with raised lines; scape blue, rest of antennæ brown, with bluish tints; first joint of funicle slightly longer than pedicel; mesoscutum and scutellum with sculpture similar to that on head, but coarser, and the carinæ higher, the sculpture producing the appearance usually designated in this group as scaly; median lobe of mesoscutum at apex with two depressions, but these covered with sculpture exactly as rest of mesoscutum and not resembling foveæ; propodeum smooth, with the usual two medial carinæ and the lateral carinæ; wings hyaline; legs blue, the tibiæ at apices, testaceous; basal joints of tarsi white; abdomen smooth, polished.

Male.—Length about 1 mm. Similar to the female, the scutellum bronzy, antennæ entirely blue, the funicle four-jointed, the legs colored as in the female.

Habitat.—Salt Lake, Utah.

Two female and one male specimens received from Bureau of Entomology, United States Department of Agriculture, under note number Webster No. 6639, with the additional data, reared from *Agromyza*, in leaves of alfalfa. C. N. Ainslie collector.

Type.—Cat. No. 14786, U.S.N.M.

Genus DEROSTENUS Westwood.

This genus was stated by Westwood in his original description to be allied to *Closterocerus* and the species here assigned to the genus bear a great resemblance to species of *Closterocerus*, but differ in generic details, such as the hyaline wings, the nonflattened antennæ, etc.

TABLE OF SOME OF THE SPECIES FROM THE UNITED STATES.

1. Middle legs, except coxæ, light colored.....*pictipes* Crawford
   Middle femora dark.....2
2. Abdomen distinctly sculptured, stigma with a very small cloud.
   punctiventris Crawford
   Abdomen smooth, wings without a stigmal cloud.....*diastatæ* Howard

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DEROSTENUS PUNCTIVENTRIS, new species.

Female.—Length about 1 mm. Green, with tints of bronzy showing in certain lights on the scutellum and apex of mesoscutum; broad apical margins of the abdominal segments black, strongly contrasting with the green of the rest of the segments; antennæ brown, first and second joints of funicle subequal in length, about as long as pedicel; club, not counting the terminal spine, about one-third longer than the two-jointed funicle, distinctly three jointed, the last with a spine as long as the segment; face above transverse furrow with shallow thimble-like punctures, these extending back of ocelli; mesonotum with shallow thimble-like punctures, these becoming more shallow and indistinct on scutellum; metanotum and propodeum with sculpture similar to that at apex of scutellum; the sculpture on the propodeum extending laterad to a furrow which is laterad of the spiracle; propodeum without median carina or lateral folds; wings with a minute fuscous spot caudad of the stigmal veins; the post-marginal vein short, the stigmal knob subsessile but greatly elongate; coxæ and trochanters dark, femora black with the bases and apices whitish; anterior tibiæ testaceous; middle and hind tibiæ yellowish-white, with a brown annulus near base; tarsi concolorous with tibiæ and with dark tips; abdomen with small crowded punctures almost resembling thimble-like punctures.

Male.—Unknown.

Type-locality.—Salt Lake City, Utah.

Specimens received from the Bureau of Entomology, United States Department of Agriculture, under Webster note No. 6639, C. N. Ainslie, collector; reared from *Agromyza*.

Type.—Cat. No. 14790, U.S.N.M.

DEROSTENUS PICTIPES, new species.

Female.—Length hardly 1 mm. Similar in color and sculpture to the above but the sculpture of the mesonotum stronger, wings without a stigmal cloud, front femora, except tips, greenish; middle legs, except coxæ, yellowish-white; hind tibiæ without an annulus near base; sculpture of abdomen coarser than in the preceding species; apical margins of abdominal segments narrowly obscurely brownish, not strongly contrasting.

Male.—Abdomen and hind legs missing; length of head and thorax 0.5 mm. Color and sculpture as in female; scape enormously swollen and sculptured about as mesoscutum; front and middle legs colored as in female.

Type-locality.—Fort Collins, Colorado.

Specimens received from the Bureau of Entomology, United States Department of Agriculture, under Webster note No. 6646, with the additional data, C. N. Ainslie, collector, reared from mines on *Hordeum*.

Type.—Cat. No. 14789, U.S.N.M.

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Subfamily TETRASTICHINÆ.

TETRASTICHUS GOWDEYI, new species.

Female.—Length about 1.1 mm. Dark greenish, so obscurely so that in certain lights it appears black; antennæ testaceous, the scape whitish, the first joint of the funicle distinctly longer than the pedicel; face finely lineolated; mesoscutem finely lineolated, the median groove very distinct, the parapsidal furrows wide and deep; median lobe of mesoscutum with a single row of large punctures along parapsidal furrows; scutellum finely lineolated, with two very distinct longitudinal furrows, the area between them not so distinctly sculptured as that laterad of them; metanotum about as long as propodeum, both indistinctly sub-reticulately lineolated; median carina of propodeum distinct; legs whitish, the coxæ greenish.

Male.—Length about 1 mm. Similar to the female except for secondary sexual characters.

Habitat.—Uganda, Africa; the female from Entebbe, the male from Nyerime, near Lake Salisbury.

The female was sent under number 2183, reared from coccid number 2169; the male has the record from coccid number 2168 on cotton.

Other specimens have the same records and others from Nyerime were from coccid number 2169 on cotton; all collected by Mr. G. C. Gowdey and transmitted by the Entomological Research Committee (Tropical Africa).

Types and paratypes.—In the British Museum (Natural History).

Paratypes.—Cat. No. 14585, U.S.N.M.

This species is named after the collector.

Subfamily ELACHERTINÆ.

ELACHERTUS JOHANNSENI, new species.

Female.—Length about 2 mm. Black, head almost smooth, with setigerous punctures; antennæ dark brown, first joint of funicle about as long as pedicel, following joints successively decreasing in length; pronotum longer than the mesoscutum, medially smooth, laterally finely reticulated; lateral lobes of mesoscutum inwardly smooth, outwardly with reticulations about as fine as those on pronotum; median lobe of mesoscutum more coarsely reticulated; middle lobe along anterior margin wider than long (about as 12:7); axillæ, scutellum, metanotum, and propodeum smooth; scutellum slightly longer than wide, flattened, so that the areas laterad of the furrows defining it are about in the same plane as the medial portion; propodeum with a strong median carina; legs very dark brown, the trochanters, extreme bases and apices of femora and the tibiæ and tarsi testaceous; postmarginal vein much shorter than marginal (about 9:15); stigmal shorter; abdomen black, smooth.

Male.—Unknown.

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One specimen with the data, "Orono, Me., July 11; Me. Exp. St. Lot 1385 Sub 5," sent by Prof. O. A. Johannsen, after whom the species is named.

Type.—Cat. No. 14595, U.S.N.M.

This species is most closely related to *E. glacialis* Ashmead, but that species has the scutellum convex, almost twice as long as wide, and the postmarginal vein about as long as the marginal.

ELACHERTUS BENEFACTOR, new species.

Female.—Length 2.5 mm. Black, with a more or less distinct aeneous luster on head and thorax; head smooth, in front of each lateral ocellus with a small reticulated area; antennæ light brown, joints of the funicle subquadrate, subequal in length, the first shorter than the pedicel; mesoscutum and scutellum distinctly reticulated, the scutellum much longer than the width between the parallel furrows; postmarginal vein distinctly longer than the stigmal; coxae black, with an aeneous tinge; femora, except tips, brown; trochanters, tips of femora, tibiæ and tarsi, testaceous; abdomen dark brown, lighter toward base.

Male.—Unknown.

Three specimens received from Dr. E. P. Felt with the labels, reared from *Evetria comstockiana* Karner, New York, June 26, 1901.

Type.—Cat. No. 14809, U.S.N.M.

This species comes nearest *cidariæ* Ashmead, but in that species the first joint of the funicle is distinctly longer than the pedicel and the scutellum between the lateral furrows is about as broad as long.

DIAULINOPSIS, new genus.

Belongs to the tribe Ophelimini as defined by Doctor Ashmead; head thin anterio-posteriorly; scape in female flattened and somewhat widened; funicle in female two-jointed, club swollen, three-jointed, with a terminal spine; in the male the scape much more widened, funicle two-jointed, club not enlarged; parasidal furrows deeply impressed, scutellum with two parallel furrows; propodeum without carinæ, and with obscure spiracular sulci; postmarginal vein almost as long as marginal; hind tibiæ with two weak apical spurs, the shorter one very obscure; abdomen sessile.

Type of the genus.—Diaulinopsis callichroma Crawford.

In Doctor Ashmead's classification this would run to number 12, where the antennal structure throws it out of both categories. In his tribe *Elachertini* (most of the genera of which have two spurs in the hind tibiæ instead of one) it runs to number 6 and does not fit any of the genera under either of the divisions created there. It has the same number of antennal joints as *Atoposoma* Masi and *Atoposomoidea* Howard, both of which were created for nonmetallic species. The former I have not seen but the latter has two apical spurs on the

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hind tibiæ, one very minute, but visible with the 65 magnification of the binocular microscope.

In general appearance this genus is much like *Diaulinus*, hence the name.

DIAULINOPSIS CALLICHROMA, new species.

Female.—Length about 1 mm. Bronzy green; scape, except tip, yellowish-white; joints of funicle subequal in length, the first about as long as the pedicel; club about as long as pedicel and funicle together; mesoscutum and scutellum longitudinally lineolate, so finely so as to appear silky; toward apex of scutellum the sculpture fainter; metanoteum and propodeum polished, almost smooth, with faint indications of sculpture; the propodeum without median or lateral carinæ, but with indistinct spiracular sulci; wings hyaline; legs yellowish-white, the coxæ and the basal half of the hind femora aeneous.

Male.—Length about 0.65 mm. Similar in color and sculpture to the female, but the scape dark, sculpture of the propodeum more pronounced.

Type-locality.—Tempe, Arizona.

Material received from the Bureau of Entomology, United States Department of Agriculture, under Webster note number 7286, with the additional note "Ex *Agromyza jucunda.*"

Type.—Cat. No. 14795, U.S.N.M.

The allotype male has one antenna beyond the scape broken off.

Subfamily EULOPHINÆ.

DIAULINUS Schulz.

Diaulus ASHMEAD, Mem. Carnegie Museum, vol. 1, 1904, p. 356 (preocc.).
Diaulinus SCHULZ, Spolia Hymen., p. 146, 1906.

On the page cited for the description of the genus by Doctor Ashmead this is given as a new genus and the type cited as *D. begini* Ashmead; on page 372, however, he says that it is a new name for *Diglyphus* Thomson (not Walker), but cites the same species as type. The status of the genus as defined in the first place must stand, and the Thomsonian genus, if not the same as Walker's, still needs a new name.

Since Doctor Ashmead never gave an extended description of the type-species some notes from the type specimen are given below.

KEY TO THE FEMALES FROM NORTH AMERICA.

1. Tibiæ with a narrow dark annulus, hardly broader than the yellow annulus basad of it.....*begini* Ashmead.
   Tibiæ with a broad dark band reaching at least past the middle.....2.
2. Annulus on hind tibiæ extending not over two-thirds length of tibiæ; postmarginal vein about as long as stigmal; furrows on scutellum as far apart as length of scutellum.....*pulchripes* Crawford.
   Aunulus on hind tibiæ extending three-fourths length of tibiæ; postmarginal vein longer than stigmal; furrows on scutellum about half as far apart as length of scutellum.....*websteri* Crawford.

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DIAULINUS BEGINI Ashmead.

Female.—Type. Length about 1.5 mm. Blue-green, with some bronzy tints; pedicel about as long as first joint of antennæ; second joint somewhat shorter than first; club three-jointed and with a terminal spine; mesoscutum with shallow, rounded punctures; sculpture of scutellum much finer, more like reticulations, scutellum about twice as long as the distance between the two furrows on it; metanotum polished, almost smooth, having very faint traces of shallow punctures, propodeum polished, with similar, more apparent sculpture; femora brown, with metallic luster, their tips and the tibiæ and tarsi whitish; tibiæ with a narrow brown annulus near base.

Type.—Cat. No. 12740, U.S.N.M.

One specimen mounted a card point and bearing the following label: "Sh. 21. 9. 96."

Many specimens determined as this species were received from the Bureau of Entomology, reared from *Agromyza* from Salt Lake City, Utah; Manhattan, Kansas; and Lafayette, Indiana.

DIAULINUS PULCHRIPES, new species.

Female.—Length about 1.25 mm. Green, mesoscutum with rounded almost thimble-like punctures; sculpture of scutellum much finer, reticulate; parallel furrows on scutellum almost as far apart as the length of scutellum; metanotum and propodeum polished, almost smooth, less distinctly sculptured than in *begini* Ashmead; postmarginal vein hardly longer than stigmal, the stigmal knob enlarged and elongated and so almost subsessile; marginal vein somewhat thickened; coxæ and femora green, tibiæ brown with metallic tints, apices of femora, bases of tibiæ, apical annulus on front tibiæ, apical half of middle and apical third of hind tibiæ yellowish-white.

Male.—Unknown.

Habitat.—Algonquin, Illinois.

Two specimens from Doctor Nason in the Ashmead collection.

Type.—Cat. No. 14793, U.S.N.M.

This is the species given under the name *Solenotus pulchripes* by Doctor Nason in his list of Algonquin Hymenoptera.

DIAULINUS WEBSTERI, new species.

Female.—Length about 1.25 mm. Dark green, similar in sculpture to the above, but the punctures of the mesoscutum finer; the sculpture of the scutellum so fine that the surface appears silky; furrows on scutellum about half as far apart as length of scutellum; metanotum smooth; propodeum with faint traces of punctures; postmarginal vein distinctly longer than the stigmal; stigmal knob normal, so that it is not subsessile; marginal vein not thickened; legs green;

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tips of femora, bases of tibiæ, apical fourth of tibiæ and tarsi except apical joints whitish.

Male.—Length about 0.9 mm. Similar to the female except in secondary sexual characters; the club of antennæ not enlarged.

Type-locality.—Temple, Arizona.

Specimens received from the Bureau of Entomology, United States Department of Agriculture, under Webster note number 7286, with the additional data "Ex *Agromyza jucunda.*"

Type.—Cat. No. 14794, U.S.N.M.

This species is named after Prof. F. M. Webster, who is in charge of the branch of investigation from which the material came.

Genus NOTANISOMORPHA Ashmead.

This genus appears to be very close to *Sympiesus*, but in addition to the characters given by Doctor Ashmead also differs in having the antennæ not or but slightly compressed and in having the propodeal spiracles situated well caudad of the base of the propodeum (in *Sympiesus* they are at the base of the propodeum).

Since Doctor Ashmead never published an extended description of the type-species of this genus, the following is given, drawn up from the type-specimen.

NOTANISOMORPHA COLLARIS Ashmead.

Female.—Length about 2.5 mm. Head and thorax bronzy green, the abdomen brown with some green tints; head and mesonotum together with the prepectus, pleuræ, and propodeum with thimble-like punctures, those on the head very fine, those on the scutellum and propodeum the coarsest; scape testaceous, pedicel somewhat darker, rest of antennæ brown; pedicel hardly half as long as first joint of funicle; second joint of funicle somewhat shorter than first; the following joints successively shorter; inflexed sides of pronotum at rear separated from dorsal aspect by a carina; mesothorax constricted anteriorly; propodeum, including neck, slightly longer than scutellum, with a median carina, the lateral folds present, their inner margins each with a carina; propodeal spiracles minute, round, situated several times their own diameter caudad of the base of the propodeum; legs, including coxæ, testaceous.

The unique type is from Cedar Point, Maryland, with the date August 22, 1883.

Type.—Cat. No. 12741, U.S.N.M.

NOTANISOMORPHA AINSLIEI, new species.

Female.—Length about 1.6 mm. Head purplish, thorax green, abdomen brown with greenish at base and apex; face finely reticulately lineolated, back of head transversely lineolated; thorax, including propodeum, with thimble-like punctures, on the pronotum

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becoming shallow and resembling reticulations and on the inflexed sides of pronotum disappearing entirely; scutellum brownzy and with the punctures elongate so that it appears somewhat longitudinally striate-punctate; propodeum with a median carina and with lateral folds not very apparent, the inner margins each with a delicate carina; prepectus with thimble-like punctures, anterior portion of mesopleuræ with similar but more shallow punctures, posterior half above, smooth, below indistinctly reticulated; legs, including coxæ, whitish-testaceous; wings hyaline, marginal vein longer than submarginal, about two and one-half times as long as postmarginal and nearly four times as long as stigmal; petiole extending slightly beyond apex of neck of propodeum.

Male.—Length about 1.25 mm. Similar to the female; antennæ with three branches reaching almost to tip of club; sculpture of scutellum more distinctly longitudinal than in female; petiole somewhat longer than in female, testaceous; abdomen with a flavous spot near base.

Habitat.—Fort Collins, Colorado.

Two females (one without abdomen) with the data reared from mines in *Agropyron*, C. N. Ainslie collector (Webster No. 6611). The note accompanying them stated that the mines were those of a species of *Agromyza*.

Type.—Cat. No. 14522, U.S.N.M.

The species is named after the collector.

This species differs from *N. collaris* Ashmead in having the head without thimble-like punctures.

Genus COMEDO Schrank.

This name must be used instead of *Cratotechus* Thomson which is isogenotypic with Schrank's genus.

TABLE OF FEMALES OF THE SPECIES FOUND IN THE UNITED STATES.

1. Legs, except coxæ, pale ..... 5.
   Legs with the femora dark colored ..... 2.
2. Club of antennæ dark colored ..... *hookeri* Crawford.
   Club of antennæ, except at times the base, whitish 3
3. Blue-green, median lobe of mesoscutum shallowly subreticulated, the reticulations at the rear twice as large as those anteriorly ..... *koebelei* Crawford.
   Aeneous, or bronzy greenish, the middle lobe of mesoscutum with thimble-like punctures, the punctures at the rear never much larger than these anteriorly. 4.
4. Wings with a deep infuscation; median carina of propodeum greatly elevated; truncation laterad of lateral folds reticulate; area between propodeal spiracles and lateral folds punctured; male antennæ simple ..... *anomocerus* Crawford.
   Wings lightly infuscated; median carina of propodeum not greatly elevated; declivity laterad of folds of propodeum smooth; area between folds and spiracles mostly smooth; male antennæ with three branches. *brevicapitatus* Cook and Davis.
5. Lateral carinæ of propodeum distinct; abdomen of female without a flavous spot ..... *smerinthi* Ashmead.
   Lateral carinæ of propodeum not distinct; abdomen of female with a large flavous spot ..... *orgyiæ* Fitch.

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COMEDO KOEBELEI, new species.

Female.—Length about 2.25 mm. Head and thorax blue-green; abdomen brown with a large whitish spot near base; face transversely rugulose; scape, pedicel, and club of antennæ whitish-testaceous, the rest of the antennæ light brown; first joint of funicle almost twice as long as the pedicel, third subquadrate; club slightly longer than first joint of funicle; thoracic notum, including metanotum and propodeum, with thimblelike punctures, those on the median lobe of mesoscutum shallow and are more like reticulations, those toward the rear of mesoscutum fully twice as large as those anteriorly; propodeum with a median carina and lateral folds, the latter each bounded inwardly by a carina; propodeum laterad of the folds truncate, the truncation inwardly smooth, polished, with a few regulæ; propodeum laterad of lateral folds finely wrinkled; prepectus and anterior half of mesopleuræ with thimblelike punctures, upper part of posterior half of mesopleuræ smooth, lower half reticulated; wings with a faint infuscation extending from the base to apex of marginal vein and apicad as far as tip of stigmal vein, but only back of this vein; marginal vein about twice as long as postmarginal; stigmal and postmarginal subequal in length; front and middle coxæ, and all femora brown, hind coxæ bronzy, rest of legs, including extreme bases and apices of femora, whitish.

Male.—Unknown.

Habitat.—Santa Cruz Mountains, California.

Described from specimens bearing the number 560 and collected by Mr. Albert Koebele, after whom the species is named.

Type.—Cat. No. 14589, U.S.N.M.

COMEDO ANOMOCERUS, new species.

Female.—Length about 2.2 mm. Head and thorax bronzy-greenish, abdomen brown with a large flavous spot near base; face finely transversely rugulose; scape, pedicel, and apical two-thirds of club whitish, rest of antennæ light brown; first joint of funicle distinctly longer than pedicel, second and third joints subequal in length, each about as long as the pedicel; mesonotum together with metanotum, prepectus, mesopleuræ, metapleuræ, and propodeum with thimblelike punctures; median carina of propodeum high, lateral folds very marked, each bounded inwardly by a carina; propodeum laterad of these folds truncate, the truncation reticulate with raised rugulæ and somewhat resembling thimblelike punctures; laterad of the folds the dorsal surface of the propodeum with shallower punctures but still very similar to those on median section; posterior half of mesopleuræ with a smooth triangular area on upper half; marginal vein about twice as long as postmarginal; stigmal and postmarginal subequal in length; wings hyaline, with a distinct infuscated band as long as and covering the marginal vein and

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extending as far out as apex of stigmal vein but not in front of it; this band extends caudad over halfway across wing; front and middle coxæ brown, hind coxæ greenish, trochanters and femora brown; tips of femora and rest of legs whitish testaceous.

Male.—Length about 2 mm. Similar to the female, but the antennæ almost uniformly reddish testaceous with the scape and apex of club somewhat whitish; funicle 4-jointed, the first joint distinctly longer than the pedicel, the second slightly shorter than the first, the third and fourth shorter subequal in length, each about as long as the pedicel; all joints of funicle simple, *without branches;* wings almost entirely lacking the fuscous cloud of the female; abdomen with a small flavous spot.

Type-locality.—Oakland Farm, Kanawha, West Virginia.

Material received under note number Hopkins, West Virginia, No. 1100.

Type.—Cat. No. 14591, U.S.N.M.

COMEDO HOOKERI, new species.

Female.—Length about 2.25 mm. Head and thorax bronzy aeneous, the abdomen aeneous with a whitish spot on the disk of the first abdominal segment; face transversely lineolate; scape testaceous, rest of antennæ brown, the first joint of the funicle about as long as the club and twice as long as the pedicel; second and third joints of funicle subequal, each about two-thirds as long as the first; mesonotum with thimble-like punctures, those on the mesoscutum so shallow as to somewhat resemble reticulations by carinæ; metanotum and propodeum with sculpture similar to that on scutellum; the metanotum medially depressed, about half as long as the propodeum; propodeum with a distinct neck which is not punctured, with a median and lateral carinæ, the lateral ones running forward to the lateral folds which are represented by foveæ-like depressions; punctures laterad of lateral folds shallow and finer than those medially on propodeum; wings hyaline with an indistinct cloud beginning at the base of the apical half of the marginal vein and extending to the apex of the stigmal vein but not anterior of the stigmal vein, the cloud extending about two-thirds of the distance across the wing; postmarginal vein longer than stigmal; coxæ aeneous; femora brown, trochanters, bases, and apices of femora, and the tibæ and tarsi entirely whitish.

Male.—Unknown.

Habitat.—Vienna, Virginia.

Host.—Pyrophila pyramidoides.

Type.—Cat. No. 14590, U.S.N.M.

Specimens received from the Bureau of Entomology, United States Department of Agriculture, under note number, Quaintance No. 7043, C. W. Hooker collector, with the date 6.5.11.

This species is named after the collector.

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DRAGON FLIES OF THE CUMBERLAND VALLEY IN KENTUCKY AND TENNESSEE.

By CHARLES BRANCH WILSON,
Of the Department of Biology, State Normal School, Westfield, Massachusetts.

INTRODUCTORY.

During the summer of 1911 the author traveled nearly the entire length of the Cumberland River in the interests of the United States Bureau of Fisheries. While the party was studying especially the fresh-water mussels of the river, there were frequent and excellent opportunities for collecting the Odonata.

These opportunities were improved as far as possible, and a list is here presented of the different species obtained, together with their observed range and habits. This is the first attempt, so far as known, to report the dragon flies of this particular locality, and it must of necessity be very incomplete, but it is hoped that it may at least form a foundation for future observation, and give a general idea of the odonate fauna of the region. Having had previous experience with river collecting, a small .22-caliber rifle and cartridges loaded with dust shot were provided in addition to the usual collecting outfit. Such species as could not be secured in any other way were brought down with the dust shot. These were usually mutilated and of no use for museum purposes, but scarcely one of them was injured enough to render it incapable of identification, which is all that is required for determining the fauna of the valley. The general itinery of the trip, so far as the Odonata were concerned, was as follows: Starting at Jellico, Tennessee, June 28, 1911, on the Clear Fork of the Cumberland River, the party worked the upper portion of the river as far down as Burnside, Kentucky, from various railroad centers. Thence they proceeded by boat down the river through Kentucky and into Tennessee as far as Clarksville, a distance from Jellico of about 600 miles. Side trips were also made up all the tributary rivers, streams, and creeks of any size. Constant watch was kept for both dragon flies and damsel flies, and specimens were collected at different places on the river bank in addition to the specimens taken from the

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boat all the way along. The specimens of dragon flies were identified on the spot, that there might be no fading of colors, and were then shipped by mail. One large box, containing specimens from the lower part of the river, was lost in transit. While a list of the species had fortunately been kept, the exact localities and dates were lost. These have been supplemented so far as possible from the notebook, but there is still somewhat of a dearth of localities from the lower river, which did not really exist.

For the opportunities thus enjoyed, as well as for permission to publish the present paper, the author tenders sincere thanks to the honorable Commissioner of the Bureau of Fisheries.

LIST OF SPECIES.

1. TACHOPTERYX THOREYI (Hagen).

A male and a female of this large species were obtained near the Great Falls of the Cumberland, one on July 5, the other on July 8. The former, the male, was captured on the bank of the river; the latter was 10 miles away in a sunny place beside the stage road and at a considerable elevation among the mountains. Both were easily captured while resting, for there is no difficulty in approaching them at such times, as has been noted by Williamson and others. But while hunting their prey they are strong and swift fliers, and their habits much resemble those of *Æshna* or *Anax*. From these and other large species they can be distinguished, even while flying, by their brown markings in place of blue or green or yellow. Many besides those captured were seen while driving 14 miles along this same road.

2. GOMPHOIDES OBSCURA (Rambur).

This species was very common on the Clear Fork of the Cumberland River at Jellico, Tennessee, June 28, and a dozen of each sex were obtained. Another single specimen was captured on the Big South Fork of the Cumberland near Parkers Lake post office July 9. Both sexes rest much of the time upon the sand on the river bank in the bright sunshine. They are easy to approach and capture at such times and are not as swift fliers as many of the gomphines.

3. GOMPHUS VASTUS Walsh.

One female was taken at the Great Falls of the Cumberland, July 6, and a male and female were obtained on July 18 at Indian Creek Landing, Russell County, Kentucky. The greatly dilated seventh, eighth, and ninth segments and the bright yellow on the sides of the ninth segment are conspicuous even in flight.

The species was common at least down to the State line between Kentucky and Tennessee. It is quite active and the males are hard to capture, since they persist in alighting amid the brush near the water's edge.

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4. GOMPHUS NOTATUS Rambur.

A single male was captured at the Great Falls of the Cumberland, July 5. It was flying up and down the river over the swift water just above the falls. It is a very strong flier and is exceptionally active, remaining a long time on the wing. Indeed, this one did not alight at all during the hour that it was watched. The species is comparatively rare, since no other specimens were seen during the summer.

5. GOMPHUS SPINICEPS (Walsh).

A single female was captured in the long grass on the banks of Greasy Creek in Russell County, Kentucky, July 17. Quite a number of specimens were present in the immediate vicinity, but it was practically impossible to detect any of them before they flew up out of the grass. The one obtained was caught accidentally while sweeping the grass for damsel flies. It is a strong flier and frequents the vicinity of riffles, where the water flows rapidly over small stones. It is recorded by Williamson from Tennessee.

6. GOMPHUS DILATATUS Rambur.

A single female was taken at Jellico, Tennessee, June 28, on the Clear Fork of the Cumberland. This is one of the larger species, but did not prove so difficult to capture, since it may be approached with comparative ease while at rest. Several other specimens were seen at the same locality, but it was not found anywhere else during the summer.

7. GOMPHUS PLAGIATUS Selys.

This species was common all along the river from Burnside, Kentucky, to Nashville, Tennessee. It frequents the riffles, flying back and forth over the swift current, and is seldom seen in the long stretches of quiet water between. Frequently it dives into the water for its prey, plunging entirely beneath the surface. It immediately comes forth, spreads its wings, and flies away into the very top of one of the tallest trees along the river bank, there to enjoy its meal in quiet security.

It very seldom alighted on the shore and proved difficult to capture, all the specimens having to be shot either while hovering over the water or while munching their prey in the trees.

It may be recognized when flying near at hand by the reddish-brown posterior end of the abdomen, which stands out in good contrast to the darker color of the rest of the body. About a dozen specimens were obtained at various riffles on the river in Russell, Cumberland, and Monroe Counties, Kentucky, and Clay and Jackson Counties, Tennessee. In hovering over the water the abdomen is not elevated, as in the following species, but is held nearly horizontal.

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8. GOMPHUS PALLIDUS Rambur.

This species was also fairly common at the riffles, but unlike *plagiatus* it frequently alighted on the river bank and was then comparatively easy to capture. Several tenerals were secured at Cloyds Landing, Monroe County, Kentucky, that had just emerged on the morning of July 23. Four of the larvæ crawled out on the boat during the night, and the soft imagos were found alongside the exuviæ the next morning.

This species first appeared at some riffles about 30 miles below Burnside, but quickly became common.

It flies comparatively slowly and hovers a great deal; its wings have a yellowish tinge, very visible when hovering; it often plunges entirely beneath the water when capturing its prey, and then mounts high in the air and seeks the tops of the tallest trees. When it alights on a pebbly beach it hovers a moment and apparently feels the rock, testing it before settling, and meanwhile holding its abdomen pointing upward. It then settles down slowly, lowering the abdomen until it is flat against the rock. In this position its colors harmonize so well with its surroundings that it can be seen only in a favorable light. It also frequently alighted on the boat, holding its abdomen elevated at an angle of about 45°.

9. DROMOGOMPHUS SPINOSUS (Selys).

This species was common on the upper part of the river from the Great Falls down to the State line. It was also obtained on the Big South Fork, opposite Parker's Lake post office, in Pulaski County, Kentucky. On the main river specimens were obtained at Burnside, Mill Springs, Indian Creek Landing, Cloyd's Landing, and Black's Ferry. It is quite active but alights frequently along the shore and can then be captured. It is not confined to the vicinity of rapid water like the two preceding species, but is found anywhere in sunny localities, usually on rocky ledges. Like the preceding species it dives into the water for its food, but is satisfied with ordinary underbrush or even the rocks as a dining place. In ovipositing the females skim along very swiftly close to the surface of the water, which they touch with the tip of the abdomen at long intervals, without visibly checking their speed, after the manner of *Macromia*.

A male taken at Black's Ferry had the dorsal surface of the tenth segment washed with greenish-yellow like the female.

The newly emerged imago has a decidedly yellow dorsal stripe; this then becomes olive, and in the old males gradually disappears leaving the abdomen almost entirely black.

10. BOYERIA VINOSA (Say).

A single male was captured July 5 at the Great Falls, and two other individuals were seen in the immediate vicinity. It was also

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found sparingly at different points on the river, notably at Indian Creek Landing, July 19, and Black's Ferry, July 24.

It frequented the thicker woods where the trees overhung the water. Here both sexes were found attached to the under side of twigs in close proximity, after the manner of *Macromia*, and when disturbed they returned to the same spot again and again.

11. MACROMIA ILLINOIENSIS Walsh.

The most common of all the dragon flies, it is seen everywhere up and down the river, in quite sunny places as well as at the riffles.

It is a very rapid flier, especially when frightened, or when chasing its prey or other dragon flies, and it never hovers and rarely alights. When two of them come together from opposite directions a fierce fight often takes place, and one of the contestants is sometimes thrown into the water. They are constantly upon the wing in search of food, and they fly so rapidly and dodge so quickly that it is next to impossible to catch one in a net. But they have a habit of congregating in favorite spots among the low bushes, often in company with *M. tæniolata*. Here they hang by their legs from the under side of the branches, sometimes several individuals occupying the same branch. Even then it is difficult to get up to them with a net, but they can be easily approached near enough for shooting.

In this way a dozen specimens of this and the following species were obtained within 20 minutes in the low bushes beside the wagon road leading to the ferry at Cairo, Wilson County, Tennessee, August 19. A curious habit was also noted: About sunset they resort to the cornfields on the river bottoms and patrol them until dark. In doing this they fly between the rows of corn about 3 feet above the ground, going up one row and down the next with remarkable regularity. This habit was observed on many different occasions; indeed, scarcely a cornfield was visited at that time of day without seeing one or more of these Macromias.

12. MACROMIA TÆNIOLATA Rambur.

This larger species in every way resembles the smaller preceding one. When on the wing the two show scarcely any difference except their relative size. These larger ones are veritable hawks, intensely rapacious, swift enough to catch and strong enough to overpower and eat almost any insect, even some of the *Gomphus* species already mentioned. They not only congregate with *M. illinoiensis*, but their habits are exactly the same. Two of the specimens mentioned above were brought down with one shot, while hanging so close together that they almost touched. On examining them one was found to be a *tæniolata* and the other an *illinoiensis*. Different species of dragon flies do not usually mingle thus intimately, especially when there is such a disparity in their size.

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Like *illinoiensis*, this species was found the entire length of the river below Burnside, not numerous at any one place, but evenly distributed throughout.

13. SOMATOCHLORA TENEBROSA (Say).

A single female was captured near the Big South Fork, opposite Parkers Lake post office, July 9. Ten or a dozen specimens of this species were patrolling back and forth just after sunset in one corner of an old pasture near a small brook at the foot of the mountains. They were strong and rapid fliers and extremely difficult to capture. They moved gracefully up and down and in and out, weaving together their paths of flight like the intricate mazes of an old-fashioned dance. But never for an instant could they be caught off their guard. At the first attempt of the net they all retired precipitately, and it was a long time before they returned again. This is a northern species and its presence in Kentucky is probably explained by the high altitude of the region where it was found and the proximity of the mountains.

14. EPICORDULIA PRINCEPS (Hagen).

A single specimen of this species was seen on the afternoon of July 20 near Burkesville, Kentucky. It suddenly appeared, apparently from nowhere, and alighted on the boat within arm's length of the author; but, of course, at the first movement it was gone, and it did not return.

15. ANAX JUNIUS (Drury).

Several specimens were seen at long intervals, one at Indian Creek Landing, July 15; another at Sandersville Ferry, just above Nashville, Tennessee, August 18; a third at Lock No. 5, Wilson County, Tennessee; and a fourth near Clarksville, Tennessee, August 27.

Each was patrolling the bank of the river, but none of them was captured.

16. PANTALA HYMENÆA (Say).

A male and female were captured at the Great Falls, July 7. They were very common around the falls and congregated in considerable numbers over the swift water after sunset. They fly rapidly and are agile dodgers. Apparently they never alight except for the night, but continue moving about restlessly and eating whatever they catch while still flying. One could often be seen to catch an insect and eat it while looking for more.

Occasionally one would mount spirally into the air until lost to view, and of course it was impossible to tell whether that one came back again to continue the hunt; but at all events the numbers did not diminish until they all disappeared at about the same time. This species was also seen at various places along the whole length of the river.

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17. TRAMEA ONUSTA Linnæus.

A single female was captured at Fishing Creek, Kentucky, July 15. Several others were seen in the vicinity, the dark bases of the posterior wings serving to identify them when everything else in sight had hyaline wings.

18. PERITHEMIS DOMITIA (Drury).

This tiny dragon fly was first seen on the river at Fishing Creek, Pulaski County, Kentucky. Afterwards it appeared every now and then all the way down the river to Clarksville, Tennessee, becoming more numerous after passing the State line.

The males were seen upon the main river, while the females were on the side creeks or in the fields at some distance from the water.

19. LEUCORHINIA INTACTA (Hagen).

This dragon fly, familiarly known as "Johnny White-face," was found only around the fresh-water ponds or on the side creeks; there were none on the river. Some of the localities where specimens were taken were Fishing Creek, Greasy Creek, Indian Creek, and Cloyds Landing, in Kentucky; Roaring River, Spring Creek, and Marrowbone Creek, in Tennessee; and around the pond at Sandersville Ferry, Tennessee.

20. ERYTHEMIS SIMPLICICOLLIS (Say).

Like the preceding, this species was found only around ponds, and its presence was always indicative of a pond or swamp in the vicinity. It was fairly common at Indian Creek Landing, and at that time (July 17) the males had not become pruinose.

At Sandersville Ferry large numbers of the species were congregated around the pond and even along the river bank for some distance above and below. By this time (August 17) the males had become entirely pruinose.

21. PACHYDIPLAX LONGIPENNIS (Burmeister).

Found in considerable numbers at Jellico, Tennessee, on the Clear Fork of the Cumberland River, June 28, and even at this date all the males were wholly pruinose. The species was subsequently taken on the Big South Fork near Burnside, at Greasy Creek, Cloyd's Landing, Butler's Landing, Carthage, Nashville, and Clarksville.

22. LIBELLULA LUCTUOSA Burmeister.

A single male was captured and several specimens of both sexes were seen at Indian Creek Landing, July 17, around the small pond. The species were seen at each of the other ponds visited, but none were found on the river.

23. LIBELLULA CYANEA Fabricius.

Two males were captured on the Clear Fork at Jellico, Tennessee, June 28, and another male at the small pond at Indian Creek Landing. Kentucky, July 17. One or two females were seen in inaccessible places where they could not be captured.

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24. LIBELLULA PULCHELLA Drury.

This large and well marked species was seen but very few times during the season, once on the Big South Fork near Burnside, July 11, a second time near the small pond at Indian Creek Landing, July 17, a third time near Gainesboro Landing, and finally near Hartsville, August 15. It seems remarkable that a species so cosmopolitan as this should be so little in evidence for the whole length of the river.

25. PLATHEMIS LYDIA (Drury).

This species was found everywhere, not on the river but up the tributary creeks and around the little pools and ponds in the pastures and fields. The first one was taken at Jellico, Tennessee, June 28, and the last one at Clarksville, Tennessee, August 30. Specimens could have been secured at every stopping place in Kentucky and Tennessee, but the males are so easily distinguished while flying as to obviate the necessity of their capture. It is seen only rarely on the river banks.

26. AGRION MACULATUM Beauvois.

Common along all the smaller shaded creeks running into the Cumberland, but never appearing on the main river. Among the localities from which specimens were obtained are Williamsburg, Kentucky, June 29; Big South Fork, Beaver and Greasy Creeks, Cloyd's Landing, Roaring River, Carthage, Hartsville, and Ashland City, Tennessee, August 27. Probably every creek and run between these geographic and time extremes would have yielded specimens. A great difference was noted in the ease with which this species could be approached at the different localities. At Williamsburg and on Beaver Creek and at Hartsville one could walk up and seize them with his fingers. At Roaring River and Ashland City it was almost impossible to get near enough to catch them with the net.

27. HETÆRINA AMERICANA (Fabricius).

This species was common everywhere along the upper portion of the river in the vicinity of swiftly running water. It is especially fond of shallow rocky ripples, either in the main river or in any of its tributary streams. Some were captured at practically every one of the ripples visited, but the numbers diminished in descending the river, until at the State line there were comparatively few. The last one seen was secured at Rome in Smith County, Tennessee. As *americana* diminished and finally disappeared the following species, *H. tricolor*, appeared, increased in numbers, and finally took the place of *americana*.

Both of these species fly until October, so that this difference in their distribution can not be attributed to seasonal changes, but must be geographical.

H. americana is a species whose range extends to the north and so frequents the upper portions of the Cumberland River among the mountains.

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28. HETÆRINA TRICOLOR (Burmeister).

This species first appeared at Celina, Tennessee, a little way below the State line. It then rapidly increased in numbers and gradually replaced *americana*, becoming the most common agrionine of the lower portions of the river.

It does not assemble in such large numbers as *americana*, and is much more difficult to capture, but otherwise is almost identical in its habits, and it frequents similarly the bushes along shallow rocky ripples. It is a southern species and so is found on the lower portions of the river among the lowlands.

29. LESTES RECTANGULARIS (Say).

The only species of the genus *Lestes* seen during the season was captured on the shore of the small pond at Indian Creek Landing. Both sexes were found in the dense underbrush on the shores, which they seemed to prefer.

30. ARGIA MOESTA PUTRIDA (Hagen).

This is one of the three common species of *Argia* found everywhere along the entire length of the river and on such of its tributaries as were visited. It does not occur in as great numbers as the following species, and is not so conspicuous in consequence of the lack of blue at the tip of the abdomen.

But it is much like them in habits and frequents sunny places on the river bank, usually alighting on the ground, on sticks, or on stones. The younger females are pale brown, in such contrast to the blue head and thorax of the fully matured adult that they look like a different species.

31. ARGIA APICALIS (Say).

This is by far the most common damselfly on the river, and during the whole season it was found in great numbers wherever the Odonata were hunted. It was as abundant on the upper river among the mountains as farther down in the lowlands.

It seems to prefer a floating chip or a board at the level of the water for oviposition. Around such places the pairs congregate, the females grasping the edge of the chip and thrusting their abdomens as far as possible beneath the water, the males holding themselves erect and perfectly straight above the neck of the female. Often the chip is covered so completely that there is not room for even one more couple. It then looks as if it were covered with a dense growth of moss, having spots of bright blue on every stem. This species was not seen to submerge itself while ovipositing as is frequently done by the preceding species.

32. ARGIA TIBIALIS (Rambur).

Not as abundant as *apicalis* but occurring in about the same numbers as *putrida*. The three were found everywhere together, but *tibialis* seemed to prefer vegetation more than the other two, and did not stick so closely to the open sunny spots. The fact that

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only two of the posterior segments are blue dorsally renders this species less conspicuous than *apicalis*.

It was rather more common during July on the upper portions of the river, and diminished somewhat in numbers during August on the lower river.

33. ARGIA TRANSLATA Hagen.

Found in company with the three preceding species, but preferring shady and secluded spots amongst dense vegetation rather than the sunny open. This is rather more of a southern species than the others, but did not occur in such abundance as *apicalis*. Furthermore none were seen ovipositing in company with the other species, but always in secluded places by themselves. A few specimens were found in every locality the whole length of the river, but it seemed more plentiful during August on the lower river.

34. ARGIA SEDULA (Hagen).

This bright-colored species was found in dense vegetation along the banks of small creeks and streams, often in company with *Agrion maculatum*. It was never found in any numbers—only straggling specimens—but was universally distributed throughout the river and during the entire summer. It is a more showy species than even *apicalis*, the wide black stripes on the blue thorax standing out conspicuously.

35. CHROMAGRION CONDITUM (Hagen).

Two females were taken in company with *Agrion maculatum* at Ashland City, Tennessee. They were on the shady bank of a small creek flowing into the Cumberland River, and were the only specimens seen during the entire season.

36. ENALLAGMA EXSULANS (Hagen).

Only two lots of this species were taken, one on the Big South Fork, July 9, and the other at Nashville, Tennessee, August 21.

The latter was near a small pond; the former was on the river bank. This highly-colored species, therefore, does not seem very common since it could hardly escape notice if present at any of the other localities visited.

37. ENALLAGMA GEMINATUM Kellicott.

A single specimen of this small species was taken on the Big South Fork in company with the preceding species, and none were seen at any of the other localities.

38. ISCHNURA POSITA (Hagen).

This tiny damsel fly was found only around the small ponds at Indian Creek Landing, Kentucky, and near Nashville and Clarksville, Tennessee. Both sexes were taken at each of these localities, but none were seen on the river or any of its tributaries.

39. ISCHNURA VERTICALIS (Say).

Found at the small pond near Nashville, Tennessee, August 21, and also near Clarksville, one week later. It was not found anywhere on the river or on any of its tributaries.

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SUMMARY.

Certain facts must be carefully considered before any conclusions of real value can be drawn.

1. While collecting was done at all times of day, from early dawn until long after sunset, yet the examination of any one locality was confined to a few hours, or at the most to a day or two.

The results, therefore, will be general, applicable to the whole river or large portions of it, rather than specific for any locality.

2. The collecting did not begin until the very last of June (the 28th); almost the whole of the best dragon fly month of the year was thereby lost, and thus the author failed to obtain some species at least that must have been present earlier in the season.

3. There was a continual progress in the localities visited, seasonally, from late in June until early in September, and geographically from the Jellico and Pine Mountains in the extreme eastern part of Kentucky through the Cumberland plateau of central Kentucky and Tennessee to the lowlands of the western portion of the latter State. Such a combination of different localities, different dates, and different elevations would preclude any data with reference to seasonal distribution. My conclusions, therefore, must be general rather than specific, geographical rather than seasonal, and must deal with the habits and habitat of the various species, and not so much with their local distribution or relative abundance. In accordance with these suggestions the following may be fairly deduced:

1. Of the dragon flies here named it may de stated that the river is entirely patrolled by the two species of *Macromia*, by two of the *Gomphus* species, *plagiatus* and *pallidus*, and by *Dromogomphus spinosus*.

2. The two species of *Macromia* are to be found everywhere, over still water as well as at the ripples, on the river, along the banks, and in the fields at some distance from the water. Although not as numerous as some of the other dragon flies, nor bunched together in restricted areas like the species of *Gomphus*, the large size of these Macromias and their superior agility easily give them the supremacy, and they are admittedly the king dragon flies of the Cumberland Valley.

3. At the ripples the species of *Gomphus* are very much in evidence, the dark-colored *plagiatus* and the light-colored *pallidus* far surpassing all the others in their geographic range, as well as in actual numbers at any one place. They are the patrols of the swift water and are almost never seen except in its immediate vicinity. While not as powerful nor as active as the Macromias, yet their influence is greatly enhanced by this habit of congregating in considerable numbers at definite localities.

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4. The function of *Dromogomphus* is that of a filler-in or supplementer. Along the quiet reaches of the river it completes the work of the Macromias, at the ripples that of the two species of *Gomphus*, and everywhere it makes good the deficiencies and omissions of these other dragon flies. Although often far more numerous than the Macromias, its inferior size and agility compel it to be satisfied with second place. And at the ripples, while it could hold its own with either species of *Gomphus* on equal terms, it is always greatly outnumbered.

5. Among the damsel flies the two species of *Hetærina* occupy the same position as the Macromias among the dragon flies. While they are found in greater numbers near swift water, they nevertheless cover practically the entire river. But there is this difference, that the species are separated, *americana* occupying the upper portions of the river among the mountains, while *tricolor* is found in the lowlands farther down. The species, therefore, can not be counted as two in comparison with those of *Macromia*, but only as one.

6. Four of the species of *Argia*, namely, *moesta putrida*, *apicalis*, *tibialis*, and *translata*, correspond very well with the two species of *Gomphus*.

While they are not confined to the vicinity of swift water, like those dragon flies, they do congregate in considerable numbers at favorable localities.

7. The odonate fauna of the Cumberland River is thus made up practically of these five dragon flies and six damsel flies, and all the other species here enumerated are in a measure incidental or accessory.

8. The general course of the Cumberland River is a crescentic curve, convex toward the south, so that the mouth is practically on the same parallel as the source. Nevertheless the combination of mountains, an elevated plateau, and lowlands results in a corresponding combination of northern, cosmopolitan, and southern species in the odonate fauna.

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DESCRIPTIONS OF A NEW GENUS OF ISOPOD CRUSTACEANS, AND OF TWO NEW SPECIES FROM SOUTH AMERICA.

By HARRIET RICHARDSON,
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Six species heretofore referred to the genus *Cirolana* are herein transferred to a new genus, of which *Cirolana orientalis* Dana is designated as the type. Two new species of the genus are also described, one collected on the east coast and the other on the west coast of South America. Only one of the six known species is from South America, the others being from North America and the Orient.

EXCIROLANA, new genus.

Head with the front produced in the middle in a process which separates the basal articles of the antennæ and extends anteriorly, becoming dilated at its extremity and confluent with the frontal lamina.

All the segments of the abdomen with the sides free, those of the fifth not covered by the lateral angles of the preceding segment.

Uropods and terminal segment of abdomen furnished with long plumose hairs, the outer margin of the external branch being always naked.

Pleopods with both branches long, slender, and tapering.

Mouth parts as in the genus *Cirolana*.

Type of the genus.—*Cirolana orientalis* Dana, from the Sulu (Jolo) Sea.

The other species referred to this genus are:

Excirolana armata (Dana), from Rio Janeiro, Brazil;

Excirolana mayana (Ives), from Yucatan;

Excirolana linguifrons (Richardson), from Monterey Bay, California;

Excirolana chiltoni (Richardson), from San Francisco, California;

Excirolana japonica (Thielemann), from Japan;

and the two new species described herein.

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EXCIROLANA CHILENSIS, new species.

Body oblong-ovate and very convex. Color, in alcohol, yellow, marked with scattered arborescent black markings.

Head large, wider than long, with the front excavate between the antero-lateral angles and the median process for the reception of the basal articles of the first antennæ. Antero-lateral angles obliquely truncate. The anterior margin is produced in the middle in a long, narrow process between the basal articles of the first antennæ and becomes dilated at its extremity, which is continuous with the frontal lamina. The eyes are large and subquadrate and extend half the length of the lateral margin. The peduncle of the first antennæ is composed of three articles, the first two of which are subequal and dilated, being about as wide as long; the third article is shorter and narrower than either of the other two; the flagellum is composed of 15 articles and extends to the posterior margin of the third thoracic segment. The second antennæ have a peduncle composed of 5 articles, the first two of which are directed forward, the basal one being concealed in a dorsal view by the first antennæ; the first 4 articles are short, the fifth being much longer than any of the others; the flagellum is broken off at the ninth joint.

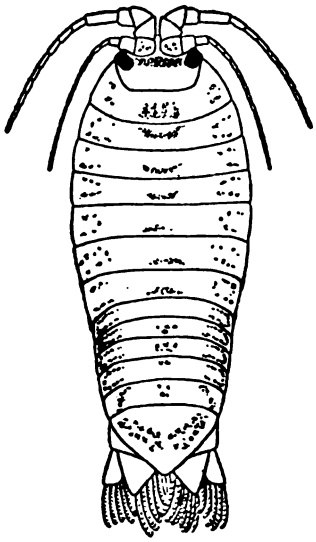

FIG. 1.—EXCIROLANA CHILENSIS ×6.

The segments of the thorax are subequal. All, with the exception of the first, are provided with wide, subquadrate epimera. The greatest width of the thorax is 4 mm.

The first 5 segments of the abdomen are short and subequal, all visible in a dorsal view, the fifth being free at the sides, which are not covered by the fourth segment. The sixth or terminal segment is wider than long, 2½ mm.: 1½ mm., and is triangularly produced at its posterior extremity. The length of the entire abdomen is 4 mm. The peduncle of the uropoda is produced at its inner extremity; the inner branch is wide and has the posterior extremity obliquely truncate; the outer branch is about half as wide as the inner branch and also has the posterior extremity obliquely truncate, but less so than the inner branch. The posterior margin of the terminal abdominal segment as well as the posterior margin of the uropoda is fringed with long plumose hairs.

The first three pairs of legs are prehensile, the last four pairs ambulatory; all are furnished with spinules.

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Only one specimen was obtained by the U. S. Bureau of Fisheries steamer *Albatross* off Lota, Chile, at a depth of 677 fathoms in yellow mud.

Type-specimen.—Cat. No. 43654, U.S.N.M.

This species differs from all the known species of the genus in the form of the head, which has the antero-lateral angles produced and obliquely truncate, and in having the two basal articles of the peduncle of the second antennæ directed forward.

EXCIROLANA BRAZILIENSIS, new species.

Body oblong-ovate, convex. Length 4½ mm.; width 2 mm. Color in alcohol, yellow, marked with arborescent black markings.

Head about twice as wide as long; antero-lateral angles rounded. Anterior margin produced in the middle in a long, narrow process between the basal articles of the antennæ and dilated at its extremity, which is confluent with the frontal lamina. Eyes large, subquadrate, and occupying almost the entire lateral margin; they are separated by a distance equal to the width of one eye. The first pair of antennæ have the two basal articles of the peduncle subequal and dilated; the third article is narrower, but not longer than the second; the flagellum is composed of 10 articles, and extends to the posterior margin of the third thoracic segment. The second antennæ have a peduncle composed of 5 articles, the first four of which are short, the first and second being subequal, and the third and fourth subequal, each of the second pair being twice as long as either of the first pair; the fifth is twice as long as the fourth; the flagellum is composed of 13 articles and extends to the posterior margin of the fifth thoracic segment.

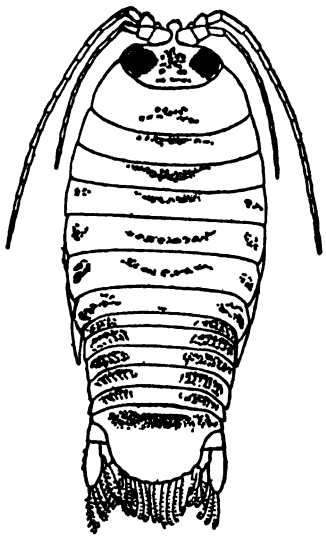

FIG. 2.—EXCIROLANA BRAZILIENSIS X15.

The first, fifth, and sixth segments of the thorax are the longest and are subequal; the second and third segments are the shortest and are subequal; the fourth and seventh are subequal. Epimera are present on all the segments with the exception of the first and are in the form of subquadrate plates, which in the last four have the outer post-lateral angles slightly produced backward.

The first 5 segments of the abdomen are short and subequal, the first being half covered by the seventh thoracic segment; all 5 segments are free at the sides, the last not being covered by the pre-

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ceding segment. The sixth or terminal segment is widely rounded posteriorly, crenulate, and fringed with long plumose hairs. There is a crescentiform depressed area near the base of the segment. The peduncle of the uropoda is slightly produced at the inner posterior angle; the outer branch is long, oval in shape, about twice as long as the inner branch, is posteriorly rounded, and extends some distance beyond the tip of the terminal abdominal segment; the inner branch does not quite reach the tip of the terminal segment and is notched on the exterior margin near the posterior extremity. Both branches are fringed with long, plumose hairs, the outer margins being naked.

The first 3 pairs of legs are prehensile, the last 4 pairs ambulatory; all are thickly furnished with spinules.

Only one specimen was collected by the U. S. Bureau of Fisheries steamer *Albatross* at station 2758, off Cape St. Roque, Brazil, at a depth of 20 fathoms, among broken shells.

Type-specimen.—Cat. No. 43655, U.S.N.M.

This species is close to *Excirolana armata* (Dana)[1] from Rio Janeiro, but differs in the much larger eyes, the shape of abdomen and uropods, and in the proportions and length of the latter.

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[1] U. S. Expl. Exp., vol. 14, Crust., 1853, p. 771, pl. 51, fig. 5 a–e.

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NOTES ON SAWFLIES, WITH DESCRIPTIONS OF NEW SPECIES.

By S. A. ROHWER.

Of the Bureau of Entomology, United States Department of Agriculture.

The following paper, which deals with sawflies collected from various parts of the world, is presented for publication now because it contains miscellaneous new species and notes which can not well be included in any revision in progress, and as some of the new species are of economic importance it is desirable that their names be made available. Some of the sawflies were collected by Messrs. Bryant and Palmer, in Java. All of these species have been worked up, and as all of them were new, a complete report of the sawflies of this expedition will be found on the following pages. Most of the Nearctic species described have been received for determination through the Bureau of Entomology. A synopsis of the Nearctic species of the genera *Lagium* and *Labidia* is included, as it may be useful in determining the species described as new.

This paper, which is the second stated contribution from the Branch of Forest Insects, Bureau of Entomology, which has appeared in these proceedings,[1] is the result of work on miscellaneous material accumulated by the bureau and from the collection of the Museum in connection with the study of sawflies injurious to forest trees.

Superfamily MEGALODONTOIDEA.

Genus PAMPHILIUS Latreille.

PAMPHILIUS (PAMPHILIUS) NIGRITIBIALIS, new species.

Male.—Length 7 mm. Anterior margin of the clypeus broadly rounded, from the bases of the antennæ and extending on the clypeus is a U-shaped carina; lateral supraclypeal area dull; frontal crest very strong so the face is perpendicular, the crest deeply broken by the antennal furrows; a V-shaped area above the crest, defined by carinæ, the surface granular; anterior ocellus nearly completely enclosed by a carina, just in front of the ocellus is a smooth depression; posterior orbits and behind the supraorbital line polished, with a few

[1] Proc. U. S. Nat. Mus., vol. 41, 1911, pp. 377–411.

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scattered punctures; postocellar area slightly longer than the latrad width; antennæ 25-jointed, the third joint about one-fifth longer than the fourth; mesonotum polished, with a few scattered punctures; hypopygidium broadly rounded apically. Black; front below crest except the antennal furrows, scape beneath, spot on mandibles, palpi, spot on superior posterior orbits, tegulæ, spot on meso- and meta-scutellums, four anterior legs below trochanters, and posterior femora bright yellow; abdominal segments four to six rufous; wings hyaline, viterous; venation pale brown.

Oxbow, Saskatchewan, Canada. Two males, one June 19, 1907 (type), the other June 15, 1907, collected by Fredrick Knab.

Type.—Cat. No. 14511, U.S.N.M.

Superfamily TENTHREDINOIDEA.

Family ARGIDÆ.

Genus ARGE Schrank.

ARGE GEEI, new species.

Very like *pagana* (Panzer) but may be separated from it by the following characters: Apical margin of the clypeus subdepressed; frontal basin slightly broadening in front of the anterior ocellus; postocellar line subequal with the ocellocular line (in *pagana* it is much less); the basal joint of the anterior and posterior tarsi longer; abdomen with fine, short hair the color of the tergument; nates more sharply pointed; and minor, unimportant differences in venation.

Soochow, China. Six females from N. Gist Gee, for whom the species is named.

Type.—Cat. No. 14484, U.S.N.M.

ARGE SALICIS, new species.

Hylotoma pectoralis SCHWARZ, Proc. Ent. Soc. Wash., vol. 11, 1909, p. 106.

The type of *Arge pectoralis* Leach is apparently lost, at least it is not in the British Museum, and as the description applies equally well to any one of a number of species, it is deemed advisable to consider the species described by Leach as undeterminable.

Salicis is related to *dulciaria* Say, as determined by Walsh, but may be separated from that species by the middle basin being closed below and distinctly separated from the middle fovea. There are also some differences in the saws and the genitalia, and these will be figured and described elaborately in a revision of the American Arginæ.

Plummer's Island, Maryland. Many males and females collected, or bred from larvæ, on the *Salix niger*.

Type.—Cat. No. 14759, U.S.N.M.

The above short description is offered at this time so the parasites of this species may be given their correct host's names.

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Genus NEOPTILIA Ashmead.

NEOPTILIA MALVACEARUM (Cockerell).

Nematonéura malvacearum COCKERELL, Insect Life, vol. 7, No. 3, 1894, p. 252.

In characters which may be useful to separate genera this species differs from the type of the genus in the rather shorter flagellum and third basitarsis. The nonclaviform antennæ exclude it from *Nematoneura*. The antennæ are about as long as the mesonotum; the flagellum is of nearly uniform width throughout.

Judging from the description *Rhagonyx* is a synonym of *Neoptilia*.

TANYPHATNIDEA, new genus.

Belongs to Stericticphorinæ. In Konow's latest tables to this group this genus would seem to run to *Nematoneura* Andre; or, assuming that the flagellum is not claviform, to *Tanyphatna* Konow. From both of these genera it may be separated by the second and third cubital cells, each receiving a recurrent vein.

Head much narrower than the thorax; clypeus slightly emarginate; antennæ inserted near the middle of the face; malar space large, greater than the width of the mandibles at the base; posterior orbits broad; ocelli in a low triangle, the lateral ones on the supra-orbital line; pedicellum very short, much wider than long; flagellum rather long and thickening apically; thorax normal; propodeum chitinous; tibiæ without spines; basitarsis III much shorter than the following joints; sheath broad basally, narrowed apically; tarsal claws simple; basal vein joining the costa at the origin of the cubitus; radial cell appendiculate; four cubital cells, the third large, the second and third each receiving a recurrent vein; transverse median near the middle of the cell; hind radial cell appendiculate; two discal cells; lanceolate cell subequal in length with the petiole; anal vein normal.

Type.—Tanyphatnidea microcephala Rohwer.

TANYPHATNIDEA MICROCEPHALA, new species.

Female.—Length 8 mm. Labrum broadly rounded apically, rather long; clypeus depressed apically, convex basally, the apical margin arcuately emarginate, sharply defined above by the suture; supraclypeal foveæ deep, punctiform; supraclypeal area flat; antennal foveæ present laterally, elongate; middle fovea elongate and extending to the anterior ocellus; postocellar area obsolete; postocellar line much shorter than the ocellocular line; antennæ about as long as the thorax; stigma long, strongly tapering; first recurrent vein in basal third of cell, second recurrent a little basad of the basal third; third transverse cubitus straight, about half as long again as the

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second transverse cubitus; transverse median of the hind wings in apical fourth of cell. Head, mesosternum, scutellum, metanotum, and dorsal part of the abdomen blue-black; antennæ and legs (except the anterior tibiæ within, which are piceous) black; the rest of the insect reddish-yellow; wings dark brown, venation black, except the costa is reddish. Sheath in part black.

Tjibodas, Mount Gede, Java. Female collected September 1909 at an altitude of 4,000 feet by Bryant and Palmer.

Type.—Cat. No. 14509, U.S.N.M.

Family DIPRIONIDÆ.

Genus DIPRION Schrank.

DIPRION GRANDIS, new species.

The Bull Pine Sawfly SWENK, 24th Annual Report, Nebraska Agricultural Experiment Station, 1911, pp. 1–33.

As this species is of economic importance, the following description is given so the name will be available; a more elaborate description will be published in a revision of the North American Diprionidæ.

It is related to *townsendi* (Cockerell), but may be separated from this species by the emargination of the last ventral abdominal segment, not being more than one-fourth as deep as wide; third and fourth joints of the maxillary palpi being subequal and the antennæ being 24 to 26 jointed; scutellum also sparsely punctured. Female length 11.5 mm.

Crawford, Sioux County, Nebraska.

Males and females bred from the larvæ on *Pinus scropulorum* by M. H. Swenk.

Type.—Cat. No. 14758, U.S.N.M.

Family TENTHREDINIDÆ.

Subfamily ALLANTINÆ.

Genus AMETASTEGIA Costa.

AMETASTEGIA (EMPHYTINA) PALLIDISCAPA Rohwer.

Ametastegia (Emphytina) pallidscapa ROHWER, Proc. U. S. Nat. Mus., vol. 41, No. 1866, 1911, p. 401.

The second "i" was by error omitted in the original publication. The specific name should be *pallidiscapa.*

ALLANTIDEA, new genus.

Belongs to Allantini and is related to *Allantus* Panzer, from which it may be separated by the nasal margin of the eyes strongly con-

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verging to the clypeus, the position of the transverse median and other characters. In habitus this is related to *Taxonus* Hartig, but the hind basitarsis is much shorter than the following joints united, so it falls in Allantini.

Clypeus broad, short, very deeply emarginate, malar space wanting; eyes large, strongly converging, separated at the clypeus by but little more than their length; posterior orbits broad, but their greatest diameter less than the cephal-caudad diameter of the eye; antennæ rather stout, thickened in the middle, third joint much longer than the fourth, pedicellum but little longer than the apical width; venation very like *Taxonus;* transverse median distinctly, but not markedly, basad the middle of the cell; tarsal claws bifid, the inner tooth shorter.

Type.—*Monophadnus bengalensis* Cameron.

Genus MONOSTEGIA Costa.

MONOSTEGIA NEARCTICA, new species.

From *Monostegia martini* MacGillivray this may be distinguished by the pale clypeus and scutellum.

Female.—Length 6.5 mm. Apical margin of the labrum broadly rounded; clypeus broadly, arcuately emarginate, lobes low rounded apically; supraclypeal foveæ confluent with the antennal foveæ; supraclypeal area gently convex; middle fovea elongate extending to the anterior ocellus; antennal furrows complete; postocellar line shorter than the ocellocular line; postocellar furrow present; postocellar area about one-third broader than long; third antennal joint one-third longer than the fourth; stigma gently rounded below; sheath straight above, rounded apically (more strongly so ventrally). Reddish yellow; head (except clypeus, labrum, and mandibles), prescutum and scutum (except sutures), mesopectus and sheath black; wings dusky hyaline, venation dark brown.

Male.—Length, 6.5 mm. Hypopygidium gently rounding to a truncate apex. Differs from the female in the piceous antennæ and in having a large part of the mesepisternum black.

Newtonville, Massachusetts, June, 1906. Bred specimens issuing June 24–25, 1906. Host ?

Type.—Cat. No. 14699, U.S.N.M.

Genus PSEUDOSIOBLA Ashmead.

This genus belongs to the tribe Eriocampini.

PSEUDOSIOBLA FLORIDANA (Provancher).

Three males from Newington, Fairfax County, Virginia, May 30, 1911, and June 4, 1911 (S. A. Rohwer), differ from the type only in the following characters: labrum, clypeus entirely and tegulæ black;

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bases of anterior femora and apices of hind tibiæ black, not brownish black.

Female.—Length 10 mm. The female differs from *robusta* (Kirby) in the following characters: postocellar area slightly wider posteriorly than the cephal-caudad length (in *robusta* the posterior width is about twice as wide as the cephal-caudad length); posterior and superior orbits more closely punctured; wings and stigma darker apically.

Newington, Fairfax County, Virginia, four June 4, 1911, three May 30, 1911 (S. A. Rohwer). Glencarlyn, Virginia, one female May 31, 1911 (S. A. Rohwer). This species in the adult is very sluggish. It flies around *Cephalanthus* just as the flowers are beginning to form.

In couplet 1, on page 403, Proc. U. S. Nat. Mus., vol. 41, No. 1866, 1911, the last "second" should read "third."

Genus XENAPATES Kirby.

Syn. *Probleta* KONOW.

Belongs to Allantinæ, tribe Taxonini.

Cameron and Kirby, in describing the type of *Xenapates* (*Dineura? africana* Cameron), erroneously say that the anal cell of the fore wings is petiolate and that the genus is related to *Blennocampa*. An examination of the type proved that the anal cell of the fore wings is the same as (*Monophadnus*) *Allantidea bengalensis* (Cameron), which was placed by Kirby in *Eriocampa;* that is, the anal cell is of the normal type found in the Allantinæ, but the second anal is not so constricted basally. The *Tenthredo incerta* Cameron belongs to *Xenapates*. This last-mentioned species has been placed in *Probleta* by Konow and certainly agrees with his generic description. The type of *Probleta*[1] has not been studied, but judging from the description and the inclusion of *incerta* (Cameron), it is synonymous with *Xenapates*.

A male of *Xenapates incerta* (Cameron) has been taken at Buxar Duars, Bengal, India, May, 1907, by D. Nowrojee.

Subfamily TENTHREDININÆ.

Genus SIOBLA Cameron.

Syn. *Encarsioneura* KONOW.

This genus belongs to the tribe Tenthredinini, where it is related to *Lagium* and *Sciapteryx*. The type of *Siobla mooreana* Cameron is in the British Museum. I have examined it and find it congeneric with *Tenthredo sturmi* Klug. I therefore consider *Encarsioneura* Konow to be the same as *Siobla* Cameron.

[1] The type of *Probleta* is *Probleta collariatus* Konow, the genus being monobasic and having been described on p. 86, and not p. 161, Zeitschr. Syst. Hym. Dipt., vol. 8, 1908.

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The following species belong to this genus: *ferox* (Smith), *mooreana* (Cameron), *pacifica* (Smith), *ruficornis* (Cameron), *sturmi* (Klug), and *venusta* (Konow).

Eriocampa major Cameron and *E. punctata* Cameron I have not seen. Konow places them in *Encarsioneura*. If he is correct, they should be added to the above list.

I have examined the types of *Macrophya flavipes* Smith and *Siobla bicolor* and find that they do not belong to *Siobla*.

Tenthredo incerta Cameron has been referred to *Siobla*, but belongs to *Xenapates* Kirby.

Genus RHOGOGASTER Konow.

RHOGOGASTER TRUNCATUS, new species.

Similar to *Rhogogaster laterarius* (Cresson), but that species has the hind coxæ black; the base of the wings and venation basally yellowish; and the sheath rounded below. *Rhogogaster addendus* (Cresson) has the stigma tapering apically and is otherwise different.

Female.—Length 9 mm. Nasal margins of eyes strongly curved, reniform; labrum truncate; clypeus squarely emarginate, lobe truncate; antennal and supraclypeal foveæ confluent; antennal and postocellar furrows distinct; postocellar area transverse; third antennal joint about one-third longer than fourth; stigma truncate; sheath parallel sided, truncate apically. Black; clypeus, labrum, mandibles except piceous apices, face below antennæ, inner orbits (slightly interrupted before top of eye) and extending to occiput, curving inwardly, most of posterior orbits, most of pronotum, tegulæ, two lines on scutum, scutellum, metascutellum, large spot on mesepisternum, spot on mesosternum, mesepimeron, metapleuræ, sides and ventral aspect of dorsal segments, and apices of ventral segments yellow; legs yellow; with the following parts black: coxæ above, four anterior tibiæ and tarsi above, interrupted line on posterior femora above, posterior tibiæ above and posterior tarsi. Wings hyaline, faintly dusky, iridescent; venation black, except base of stigma, which is yellow.

Blue Mountains, Washington. One female collected July, 1896, by C. V. Piper.

Type.—Cat. No. 14298, U.S.N.M.

RHOGOGASTER PITOHATUS, new species.

Differs from *truncatus* in having the sheath straight above and broadly rounded below.

Female.—Length 9 mm.

Easton, Washington; Santa Cruz Mountains, California; Alameda, California; Oregon (Koeble); Reno, Nevada (Wickham).

Type.—Cat. 14299, U.S.N.M.

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Genus SCIAPTERYX Stephens.

SCIAPTERYX COQUILLETTI, new species.

Differs from the genotype of *Sciapteryx* (*costalis* Fabricus) in the shorter malar space and larger metepimeron, besides many minor characters.

Female.—Length 9 mm. Labrum truncate apically, sides subparallel; clypeus short, convex, angulately emarginate; interantennal line slightly shorter than the antennocular line; supraclypeal foveæ shallow, not distinctly connected with the antennal foveæ, but connected with each other; antennal and postocellar furrows obsolete, as is also the middle fovea; postocellar line subequal with the ocelloccipital line, but distinctly shorter than the ocellocular line; malar space shorter than the pedicellum; fourth and fifth antennal joints subequal; head and thorax closely and rather coarsely punctured, in the front punctato-granular; stigma angulate at basal third, obliquely truncate apically; abdomen impunctate; sheath straight above, rounded from upper apex. Black; clypeus, labrum, spot on mandible, palpi, angles of pronotum, tegulæ, spots on propodeum, apical dorsal segment, apices of four anterior femora, their tibiæ and tarsi, posterior femora except a black line beneath, posterior tibiæ except apex, most of hind basitaris yellow; head and thorax with gray hairs; wings hyaline, iridescent; venation pale brown.

Male.—Length 9 mm. The above description will fit the male very well. The antennæ are slightly longer and somewhat flattened; hypopygidium broadly rounded apically; apical ventral segment deeply emarginate.

Los Angeles County, California. A male and female collected by D. W. Coquillett, for whom the species is named.

Type.—Cat. No. 14256, U.S.N.M.

Genus LAGIUM Konow.

The genus *Lagium* was founded by Konow for *Tenthredo atroviolaceus* Norton. The species of this genus are closely related and can be separated only by the use of apparent trivial characters, except in the males where the genitalia offer good differences. It is not always possible to associate the sexes, and in none of the following cases is there positive proof that the males and females placed together are the same species, but by deduction it seems reasonably certain that they are. Except for notes on the larva of *peratrum*, which feeds on *Sanbucus*, nothing is known about the life history of the genus. Dr. H. G. Dyar, in describing *peratrum*, said that the larvæ were "remarkably specialized" for Tenthredinidæ. The adult is one of the more specialized forms of Tenthredinini. The terms used in the genitalia

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are those adopted by the writer. They are in the main those used by Hartig where the points here mentioned are figured. There is, as far as known, but little antigeny in this genus.

The Japanese species of this genus form a distinct group, but are congeneric with the type of the genus.

Key to the North American species.

Males..... 1.
Females..... 5.
1. Labrum sharply angular apically; cochlearium short, and broader apically..... 2.
Labrum obtusely angular or rounded, apically; cochlearium long, and not decidedly broader apically..... 3.
2. Abdomen beyond the propodeum reddish; metanotum coarsely punctured; third antennal joint much longer when compared with the fourth; stigma oblique apically..... *tardum*.
Abdomen entirely black; metanotum nearly impunctate; third antennal joint but little longer than the fourth; stigma truncate apically..... *angulabre*.
3. Antennal ridges obsolete; area between the ocelli and orbit coarsely sculptured.... *planifrons*.
Antennal ridges distinctly present; area between the ocelli and orbit very sparsely sculptured..... 4.
4. Apical joint of hind tarsi subequal in length with the two preceding, the third and fourth joints more robust; cochlearium as in figure 2*c*..... *atroviolaceum*.
Apical joint of hind tarsi distinctly shorter than the two preceding joints, the third and fourth joints slender and more elongate; cochlearium as in figure 2*e*..... *peratrum*.
5. Abdomen beyond the propodeum reddish..... 6.
Abdomen entirely black..... 7.
6. Antennal ridges well defined; area between the ocelli and eyes coarsely sculptured; apical angulation of labrum with the sides gently sloping so the angle is broader.. *erythrogastrum*.
Antennal ridges obsolete; area between the ocelli and eyes sparsely sculptured; apical angulation of labrum with a more acute angle..... *tardum*.
7. Antennal ridges well defined at least just below ocelli..... *peratrum*.
Antennal ridges obsolete..... 8.
8. Sheath distinctly oblique below; lower apical margin of napes scarcely produced; wings blackish..... *planifrons*.
Sheath rounded nearly evenly; lower apical margin of nates decidedly produced; wings brownish..... *atroveolaceum*.

LAGIUM TARDUM (Norton).

Allantus tardus NORTON, Boston Journ. Nat. Hist., vol. 7, pt. 2, 1860, p. 246, No. 21.
Tenthredo atroviolacea var. *tardus* NORTON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 240; Norton Catalogue, p. 172.

What is determined as this species agrees with specimens determined by Cresson from Massachusetts and also specimens in American Entomological Society's collection. It seems probable that Norton's type is lost, although it may be in the Peabody Museum. Judging from the material in the collection this is a northern species, there being no specimens from farther south than Washington, District of Columbia.

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LAGIUM ERYTHROGASTRUM, new species.

Related to *tardum*, but may be separated by the foregoing table from that species.

Female.—Length 12 mm. Emargination of clypeus at base less than the width of lobe at base; supraclypeal foveæ not connected with the antennal foveæ; middle fovea not defined but in its place a depressed area between the antennal ridges; area between the ocelli and orbits sculptured like the front; postocellar line indicated; postocellar area about twice as wide as the length; occiput slightly carinate behind postocellar area; pedicellum longer than broad; rest of antennæ want-

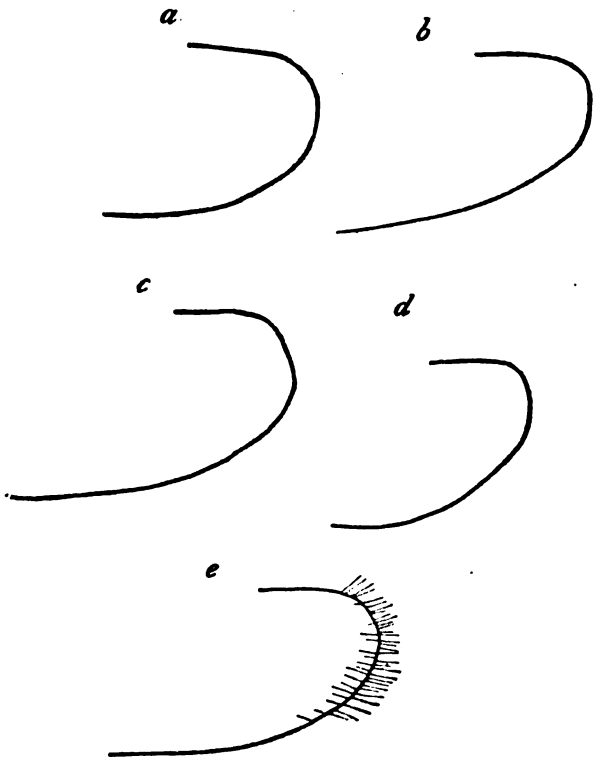

FIG. 1.—SHEATHS OF LAGIUM. *a*, PLANIFRONS; *b*, TARDUM; *c*, ATROVIOLACEUM; *d*, PREATRUM; *e*, ERYTHROGASTRUM.

ing; stigma nearly straight below, oblique apically; sheath nearly evenly rounded apically; lower, apical angle of nates scarcely produced; apical joint of hind tarsi distinctly shorter than the two preceding; inner tooth of claw shorter than the outer. Black; abdomen beyond the propodeum reddish; anterior tibiæ and tarsi in front brownish; posterior coxæ with a white spot; wings brownish.

Baldwin, Kansas. One female collected May, 1897, by Bridwell.

Type.—Cat. No. 14251, U.S.N.M.

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LAGIUM ANGULABRE, new species.

Very like *erythrogastrum* structurally and it may prove to be the male of that species.

Male.—Length 10.5 mm. In the characters of head and thorax this agrees with *erythrogastrum*. Third antennal joint much longer than the fourth; hypopygidium subtruncate. Entirely black except the pale brown intermediate knees and anterior legs below trochanters.

Baldwin, Kansas. One male collected May, 1897, by Bridwell.

Type.—Cat. No. 14252, U.S.N.M.

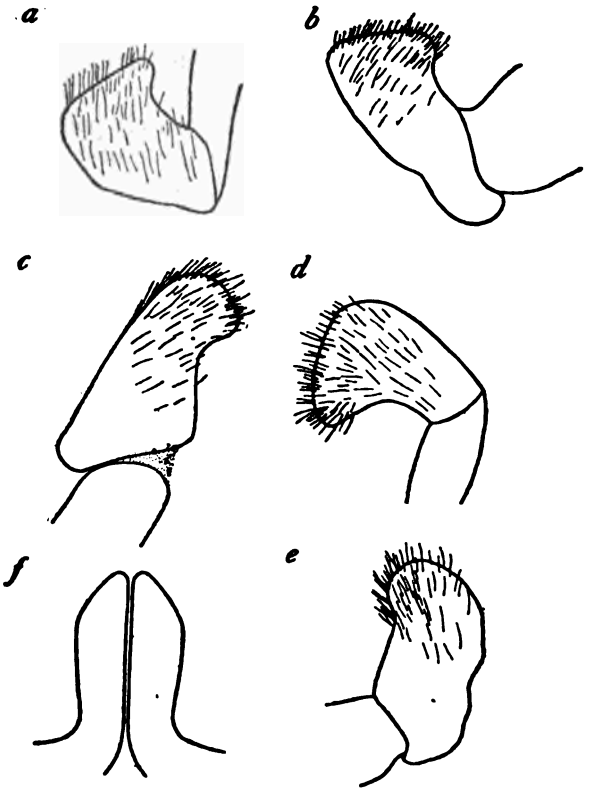

FIG. 2.—GENITAL PARTS OF LAGIUM MALE. *a–e*, LATERAL ASPECT OF COCHLEARIUM; *a*, ANGULABRE; *b*, PLANIFRONS; *c*, ATROVIOLACEUM; *d*, TARDUM; *e*, PERATRUM; *f*, VENTRAL VIEW OF THE PRÆPUTIUM OF PERATRUM.

LAGIUM PERATRUM (Dyar).

Tenthredo atroviolacea var. *peratra* DYAR, Journ. New York Ent. Soc., vol. 5, 1897, p. 192, male.

Type.—Cat. No. 4137, U.S.N.M.

This species is also found in Pennsylvania and Michigan. The type locality is Franconia, New Hampshire.

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LAGIUM ATROVIOLACEUM (Norton).

Allantus atroviolaceus NORTON, Boston Journ. Nat. Hist., vol. 7, pt. 2, 1860, p. 36, male and female.

Tenthredo atroviolacea NORTON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 239; Norton Catalogue, p. 171.

Norton's type of this species seems to be lost, as it is not in Philadelphia; however, it may be in the Peabody Museum. What has been restricted as this species was determined *atroviolaceus* by Cresson, and is represented in the collection only by specimens from New Jersey.

LAGIUM PLANIFRONS, new species.

In the female this species is very close to *atroviolaceum*, but in the male it is easily separated. The foregoing table will aid in its determination.

Female.—Length 14 mm. Labrum obtusely pointed; emargination of the clypeus distinctly broader than the lobes; supraclypeal foveæ not connected with antennal foveæ; middle fovea obsolete; antennal furrows broad, shallow and nearly continuous; postocellar furrow wanting; postocellar area about twice as wide as long; occiput carinate in middle; area between ocelli and orbits sparsely punctured; pedicellum with the length and width subequal; third antennal joint much longer than fourth; stigma rounded below, apically subtruncate; metanotum strongly punctured; sheath oblique below; nates not produced below; apical joint of hind tarsi subequal with the two preceding. Black; anterior tibiæ and tarsi pale brown beneath; hind coxæ with a pale spot; wings black.

Male.—Length 10 mm. Agrees with the above description of female, except the posterior coxæ are black. Hypopygidium broadly rounded.

Virginia; East Falls Church, May 13, 1911; Pohick Run, June 4, 1911; Newington, May 3, 1911, and June 4, 1911. Above collected by S. A. Rohwer. Also one female from Dixie Landing.

Type.—Cat. No. 14253, U.S.N.M.

ZALAGIUM, new genus.

Intermediate between *Lagium* Konow and *Macrophya* Dahlbom, but superficially more like *Lagium*. In synoptic tables with the width of facial quadrangle as the primary character, *Zalagium* will fall near *Macrophya* from which it will be separated by the long antennæ, which are flattened and constricted at the joints; the occiput not being carinated; and the normal hind coxæ. *Zalagium* may be separated from *Lagium* by the following characters: Eyes closer together at the clypeus than the length of the eye; shorter malar space; long clypeus and labrum; different punctuation and aulation of head; and the

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different genitalia of the male, the ventral aspect of the præputium being very short, as in figure 3*a*, and the apices of cochlearium being simple.

Type.—*Zalagium clypeatum* Rohwer.

Only two species of this genus are known from North America. These have the metanotum practically impunctate.

Abdominal segments three to six, reddish yellow; middle fovea very poorly defined; hypopygidium obtusely pointed.....*cinctulum.*
Abdomen entirely black; middle fovea well defined; hypopygidium subtruncate and slightly emarginate apically.....*clypeatum.*

ZALAGIUM CINCTULUM (Norton).

Tenthredo atroviolacea var. *cinctula* NORTON, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 240, female; Norton Catalogue, p. 172.

Macrophya abbotii KIRBY, List Hym. British Museum, vol. 1, 1882, p. 269, pl. 10, fig. 14, male and female.

Norton's type is perhaps lost. Every specimen in the collection has the posterior coxæ entirely black and the species extends from Massachusetts to Georgia. It is therefore probable that Norton omitted to say the black spot was wanting. It is certain that the species here treated as *cinctulum* is the same as *abbotii*.

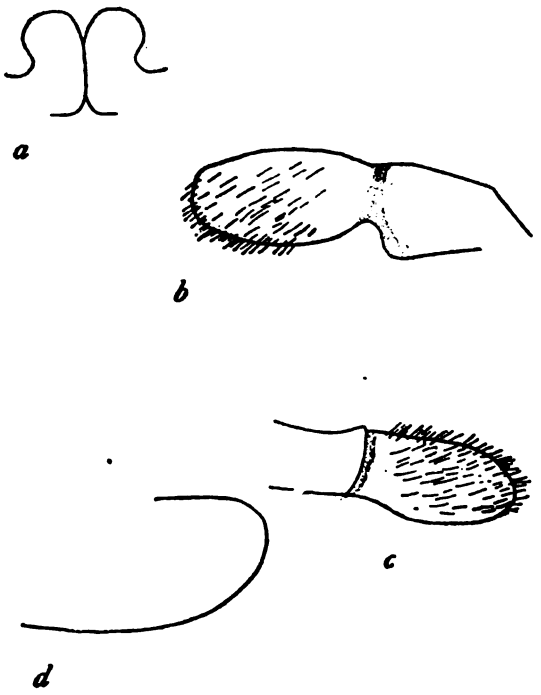

FIG. 3.—GENITIAL PARTS OF ZALAGIUM. *a*, VENTRAL ASPECT OF PRÆPUTIUM OF CLYPEATUM; *b–c*, LATERAL ASPECT OF COCHLEARIUM; *b*, CINCTULA; *c*, CLYPEATUM; *d*, LATERAL VIEW OF SHEATH OF CINCTULUM.

ZALAGIUM CLYPEATUM, new species.

Except for the characters mentioned in the table and the rather shorter antennæ this species is the same as *cinctulum*.

Male.—Length 10 mm. Pedicellum about twice as broad as long; antennal furrows present only just above the antennæ; median frontal area slightly raised; area between ocelli and orbits depressed;

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stigma tapering to apex. Entirely black, except the anterior legs in front below the trochanters, which are whitish.

Long Island, New York. One male from the Ashmead collection.

Type.—Cat. No. 14250, U.S.N.M.

Genus MACROPHYA Dahlbom.

MACROPHYA ZABRISKIEI, new species.

Female.—Length 8 mm. Related to *xanthonota* Rohwer, but may be separated from it by the following characters: Clypeus and labrum all yellow; postocellar line distinctly less than the ocelloccipital line; mesepisternum entirely black; abdomen entirely black; sheath parallel sided, apex rounded; stigma truncate apically; venation dark brown; four anterior legs below coxæ entirely pale; posterior tarsi entirely pale. Besides the color *zabriskiei* may be separated from *alba* by the arcuate emargination or the clypeus and shape of sheath.

Male.—Length 6.5 mm. The male agrees with the female, except that the clypeus is subsquarely emarginate. Hypopygidium broadly rounded apically.

Long Island, New York. One female and two males collected by J. L. Zabriskie from the Ashmead collection. One male from Canada, C. F. Baker collection. Named for J. L. Zabriskie, the collector of the types.

Type.—Cat. No. 14258, U.S.N.M.

MACROPHYA ALBA (MacGillivray).

Macrophya pulchella alba MacGillivray, Can. Ent., vol. 27, 1895, p. 285.
Macrophya zonata Konow, Wien. Ent. Zeit., vol. 18, 1899, p. 44.

This species was described as a variety of *pulchella* by MacGillivray, but it is distinct enough to rank as a species. The mere fact that Konow did not like the name is not sufficient for him to give the species a new one.

MACROPHYA XANTHONOTA, new species.

Related to *alba* (MacGillivray), but may be separated by postocellar line being subequal with the ocelloccipital line (in *alba* the postocellar line is distinctly shorter) and the black coxæ. From *epinota* (Norton), which it also resembles, it may be separated by obsolete antennal furrows, pale spot on mesepisternum, and other characters.

Female.—Length 9 mm. Labrum subtruncate, the angles rounded; clypeus deeply arcuately emarginate, lobes triangular; supraclypeal foveæ punctiform and not connected with the antennal foveæ; antennal and postocellar furrows obsolete, as is also the middle fovea; antennæ of an intermediate length; head and thorax punctato-granular; stigma angulate near base, tapering to apex; abdomen impunctate; sheath straight above, obliquely truncate apically, tapering to

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base. Black; line on clypeus, angles of pronotum, tegulæ, spot on mesepisternum, scutellum, posterior half of propodeum, apical margins of five apical dorsal segments, trochanters, bases of femora (the posterior ones broadly), four anterior tibiæ and tarsi beneath, base of posterior tibiæ, and post-basitarsis *yellow;* wings hyaline, slightly brownish, iridescent; venation pale brown.

The paratype differs in having a yellow spot on the labrum.

Fort Collins, Colorado (type): One female collected June 11, 1904. Milwaukee, Wisconsin. One female collected June 3, from the Ashmead collection.

Type.—Cat. No. 14257, U.S.N.M.

MACROPHYA MELANOTA, new species.

Superficially like *M. albomaculata* Norton, but that species, as determined by MacGillivray, has the antennal furrows present, while *melanota* has the antennal furrows obsolete. Related to *tibiator* Norton, especially varieties of this species with black hind tibiæ. From the typical form of *tibiator* it may be separated by the following characters: Postocellar area nearly quadrate, and bounded by fine furrows; antennæ cylindrical and more slender, with joints less distinctly defined; clypeus, postocellar area entirely, anterior femora beneath, propodeum and hind tibiæ black; coxæ pale apically and without a pale lateral spot on the hind pair; sheath sharply obliquely truncate.

Female.—Length 8 mm.

Northern Illinois. One female from the Ashmead collection.

Type.—Cat. No. 14261, U.S.N.M.

MACROPHYA NIGRISTIGMA, new species.

Allied to *Macrophya formosa* (Klug), but may at once be separated by the black stigma and other characters. From *Macrophya zabriskei* Rohwer it may be separated by the yellow scape.

Female.—Length 10 mm. Labrum broadly rounded apically; clypeus deeply, squarely emarginate, lobes truncate; antennal foveæ narrow, elongate; antennal furrows obsolete; head below the supraorbital line confluently punctured; above the supraorbital line shining, with scattered punctures; postocellar area not defined; postocellar line much shorter than ocellocular line; third antennal joint about one-third longer than the fourth; stigma rather narrow, rounded below, obliquely truncate at apex; sheath nearly parallel-sided, obtusely rounded at apex. Black; clypeus, labrum, spot on mandibles, scape, angles of pronotum, tegulæ, apex of prescutum, scutellum, scutellar lobe, minute spot on mesepisternum, propodeum and terminal dorsal segment, yellow; legs yellow, bases of four anterior coxæ, spot on hind coxæ, apex of hind femora, base and apex of

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hind tibiæ, base of hind basitarsis black. Wings hyaline, somewhat dusky; venation including stigma black.

In the paratype the spot on the mesepisternum is larger.

Harrisburg, Pennsylvania. One female collected by P. R. Myers, June 13, 1908 (type). Highspire, Pennsylvania. One female collected by W. S. Fisher, June 23, 1908.

Type.—Cat. No. 14570, U.S.N.M.

MACROPHYA EXTERNIFORMIS, new species.

Differs from *Macrophya externa* in having the emargination of the clypeus narrower, and more uniformly arcuate, and in shorter, stouter antennæ.

Female.—Length 8 mm. Labrum truncate, long, narrowing anteriorly; clypeus narrowly, deeply, arcuately emarginate; lobes triangular, rounded; supraclypeal area flat, shiny; middle fovea indicated by a glabrous spot; antennal furrows obsolete; postocellar line slightly shorter than the ocelloccipital; front closely confluently punctured; head behind the supraorbital line shining with scattered punctures; antennæ short, stout, of uniform thickness; the third joint but little shorter than the fourth and fifth combined; prescutum finely granular in the middle, punctate laterally; in the middle the punctures rather large; scutellum with large, distinct, separate punctures; stigma slightly broader basally, obliquely truncate apically; third cubital cell distinctly shorter than second on radius; sheath narrow, broadly rounded apically. Black; labrum, apex of clypeus, spot on mandibles, a small spot on posterior margin of propodeum, the four anterior tibiæ and tarsi beneath, spot on posterior tibiæ externally, all the trochanters, more or less, yellow; wings hyaline, apex dusky, venation dark brown.

Dane County, Wisconsin. One female collected June 20, 1900.

Type.—Cat. No. 14754, U.S.N.M.

MACROPHYA NEBRASKENSIS, new name.

Macrophya sambuci ROHWER, Can. Ent., vol. 41, 1909, p. 15; not (*Tenthredo*) *Macrophya sambuci* LATREILLE, Hist. Nat. Ins., vol. 13, 1805, p. 131, or (*Allantus*) *Macrophya sambuci* SCUDDER, Corresp. of Harris, 1869, p. 269.

MACROPHYA LINEATANA, new species.

Female.—Length 8 mm. Differs from *lineata* Norton in the following characters: Scape pale in front; stigma but slightly broader basally and truncate apically; intermediate femora entirely pale, hind tarsi black.

Virginia; Newington, Fairfax County. Female, May 30, 1911 (type); East Falls Church, May 13, 1911, female; Chain Bridge, June 14, female. Above collected by S. A. Rohwer. Kansas, Lincoln,

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Nebraska, female, April 27, 1902, collected by L. Bruner. Pennsylvania, female from C. F. Baker collection.

Type.—Cat. No. 14260, U.S.N.M.

MACROPHYA TENUICORNIS, new species.

In Enslin's revision of the Palaearctic *Macrophya* this species runs to *annulicornis* Konow, but has the clypeus and labrum yellow and the antennæ long, so it can not be confused with that species. From other species it is quite distinct.

Female.—Length 10.5 mm. Labrum truncate; clypeus shallowly, broadly, squarely emarginate, lobes narrow rounded apically; supraclypeal area flat, becoming somewhat convex between the antennæ; antennal furrows shallow, complete; middle fovea elongate; ocelloccipital line one-third longer than the postocellar line; ocellocular line four times as long as the postocellar line; postocellar furrow obsolete; postocellar area slightly wider posteriorly, the anterior width about one-third greater than the length; front sunken, so the cephalcaudad diameter of the head at the antennæ is not as great as at the orbit; antennæ 6.5 mm. long, slender, the third joint nearly as long as the fourth and fifth; thorax closely, distinctly punctured; stigma slightly narrowing apically, apex truncate; third cubital cell shorter on the radius than the second; sheath narrow, straight above, rounded apically, more strongly so below. Black; clypeus, labrum, mandibles, fourth and fifth antennal joints above, angles of the pronotum, tegulæ, spot on the scutellum, line on metascutum, two large spots on propodeum, four anterior legs except the tips of the femora and tibiæ; spot on the posterior coxæ exteriorly, basal two-thirds of posterior femora, basal two-thirds of posterior tabiæ exteriorly, posterior tarsi, except apices, yellow or yellowish. Wings dusky hyaline, venation black.

Lebong, India. One female collected at 5,000 feet, September, 1908.

Type.—Cat. No. 14755, U.S.N.M.

ZAMACROPHYA, new genus.

Habitus and head of *Macrophya*, but the metepimeron is small, as in *Tenthredo*, etc. From *Labidia*, to which it is more closely allied, it may be separated by the entire absence of dilations above the antennal sockets, and feebly defined antennal foveæ, the front being flat as in *Macrophya*.

Belongs to the tribe Tenthredinini. Clypeus deeply emarginate, malar space very narrow; nasal margins of the eyes strongly converging to the clypeus; space between the eyes at the antennæ less than the length of the eye; antennal foveæ very small; no ridges from the nasal margins of antennæ, front flat as in *Macrophya;* occiput car-

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inated; antennæ 9-jointed, short, stout, thickening apically, third joint much longer than the fourth; head and thorax coarsely punctured; metepimeron narrow, not nearly as high as the metepisternum, the dorsal margin strongly curved, hardly reaching to the propodeal spiracle; propodeum with a longitudinal suture; venation of normal type; legs similar to those of *Macrophya*, hind coxæ not quite as large as usual for *Macrophya;* abdomen short, stout.

Type.—*Zamacrophya nigrilabris*, Rohwer.

ZAMACROPHYA NIGRILABRIS, new species.

Superficially recalls *Macrophya succincta* Cresson.

Female.—Length 9 mm. Labrum long, narrowly rounded apically; clypeus polished, arcuately emarginate, lobes broad, truncate; supraclypeal foveæ small, close to the eyes, not confluent with the antennal foveæ; supraclypeal area sparsely punctured, gently convex, higher above; head coarsely striato-punctate; middle fovea and antennal furrows obsolete; postocellar area sharply defined on all sides, about twice as wide as long; postocellar line subequal with the ocelloccipital line; third antennal joint subequal in length with the two following; thorax closely, rather coarsely punctured; stigma narrow, rounded below, truncate apically; transverse radius strongly curved, received a little beyond the middle of the third cubital cell which is more than twice as broad at apex as at base and subequal in length with the first and second on the cubitus; sheath rather narrow, straight dorsally, rounded apically, oblique ventrally. Black; most of clypeus, mandibles, scape, pedicellum, dorsal and ventral margins of pronotum, most of scutellum, metepisternum, propodeum, apical margins of third and following segments, trochanters, four anterior femora beneath, tibiæ except at apex, tarsi (hind tarsi infuscate), yellow; wings yellowish hyaline; venation pale brown, costa and stigma (except base) yellowish.

Male.—Length 9 mm. Very like the female. Hypopygidium broadly rounded apically.

Meadow Valley, Mexico. Many specimens collected by C. H. T. Townsend.

Type.—Cat. No. 14621, U.S.N.M.

A specimen labeled "Wooton 52" is probably from New Mexico.

Genus TENTHREDO Linnæus.

Subgenus LABIDIA Provancher.

The name *Labidia* Provancher can be retained as a subgenus only. Separated from *Tenthredo*, as far as Neartic species are concerned, by the short, clavate, seven or eight jointed antennæ, and by having the anal cell of the hind wings longly petiolate.

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TENTHREDO (LABIDIA) ANOMOCERUS, new species.

Very distinct in the black scutellum and propodeum; seven-jointed antennæ, and other characters.

Female.—Length 9 mm. Clypeus nearly impunctate, deeply, arcuately emarginate, lobes broad, rounded apically; supraclypeal and antennal foveæ confluent; supraclypeal area convex; middle fovea confluent with the well-defined ocellar basin; lateral walls of the ocellar basin rounded; antennal furrows complete; postocellar furrow obsolete; postocellar area defined laterally; postocellar line slightly

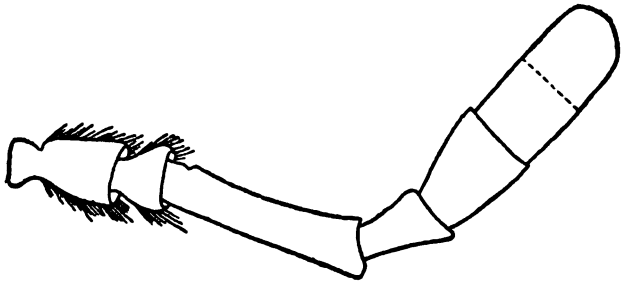

FIG. 4.—ANTENNA OF TENTHREDO (LABIDIA) ANOMOCERUS.

shorter than the ocelloccipital; antennæ seven-jointed, the apical two joints nearly consolidated; prescutum closely, sometimes confluently, punctured; scutum more sparsely punctured, with two large, nearly impunctate, areas; scutellum with separate punctures; scutellar lobe very coarsely sculptured; stigma rounded below, truncate apically; sheath broad, straight above, obliquely rounded below. Black; clypeus, labrum, mandibles (apices piceous), narrow line on the

FIG. 5.—ANTENNA OF TENTHREDO (LABIDIA) OPIMUS.

dorsal and ventral margins of pronotum, lateral spot on three basal tergites, narrow apical margins of following tergites and sternites, four anterior femora and tibiæ (except a black line above), four anterior tarsi, apices of posterior femora, their tibiæ (except apices), and tarsi beneath yellow. Wings clear hyaline; venation brown, costa and stigma yellowish. Pubescence black or blackish.

Banff, Alberta, Canada. One female from Sanson.

Type.—Cat. No. 14598, U.S.N.M.

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TENTHREDO (LABIDIA) SUBNIGRICEPS (Rohwer).

Allantus subnigriceps ROHWER, Can. Ent., vol. 41, 1909, p. 149, female.

Type.—Cat. No. 14271, U.S.N.M.

Nevada; New Mexico; Washington; California.

TENTHREDO (LABIDIA) OPIMUS OPIMUS (Cresson).

Allantus opimus CRESSON, Trans. Amer. Ent. Soc., vol. 8, 1880, p. 15, male and female.

Labidia columbiana PROVANCHER, Addit. fauna Canada Hym., 1886, p. 21, male.

TENTHREDO (LABIDIA) OPIMUS COLORADENSIS, new subspecies.

Separated from the typical *opimus* by the following characters: Hind femora black; dorsal walls of the ocellar basin sharply defined; ocellar basin rather longer, striato-granular; slightly smaller and markings paler. Female. Length 8 mm.

Short Creek, Colorado. One female.

Type.—Cat. No. 14599, U.S.N.M.

TENTHREDO (LABIDIA) ORIGINALIS (Norton).

Allantus originalis NORTON, Trans. Amer. Ent. Soc., vol. 1, 1867, p. 261, female; Norton, Catalogue, p. 123, female.

Labrador; New Hampshire.

TENTHREDO (LABIDIA) ALIENATUS, new species.

Readily separated from the foregoing species of *Labidia* by the obsolete ocellar basin.

Female.—Length 9 mm. Clypeus nearly impunctate, deeply arcuately emarginate, lobes broadly rounded apically; supraclypeal and antennal foveæ confluent; supraclypeal area convex, sparsely punctured; middle fovea large, deep; ocellar basin obsolete, but the area striato-granular; antennal furrows obsolete; postocellar furrow poorly defined; postocellar area more coarsely sculptured than the rest of the vertex, defined laterally by furrows; postocellar line subequal with the ocelloccipital line; antennæ eight-jointed, the last three joints not sharply defined; prescutum more closely punctured than the scutum; scutellar lobe closely punctured; stigma nearly straight below, apex oblique; sheath narrow, straight above, truncate apically, oblique below. Black; clypeus, labrum, mandibles (apices piceous), line on the dorsal and ventral margins of pronotum, spot on scutellum, metepisternum, narrow apical margins of abdominal segments and propodeum, four anterior femora beneath, four anterior tibiæ (except dorsal apices), four anterior tarsi except a line above, hind tibiæ except apices, yellowish-white; pubescence black, wings hyaline, slightly yellowish; venation dark brown, stigma and costa yellowish.

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Silverton, Colorado. Three females collected August 8, 1903, at an altitude of 12,000 feet, (One type). Russell County, Colorado. One female collected July 18 by H. S. Smith. Colorado. Mount Ranier, Washington, two females collected by C. V. Piper.

Type.—Cat. No. 14600, U.S.N.M.

TENTHREDO (LABIDIA) ANOMUS, new species.

Related to *alienatus*, but the sheath is obliquely rounded below, and the postocellar area is without furrows laterally.

Female.—Length 9 mm. Labrum very short; clypeus finely granular, anterior margin deeply squarely emarginate, the lobes truncate; supraclypeal and antennal foveæ confluent; supraclypeal area gently convex, very sparsely punctured; middle fovea deep, large; antennal furrows indicated by broad shallow furrows; ocellar basin obsolete, the area striato-granular; postocellar furrow obsolete; postocellar area sculptured similar to the adjoining vertex, not defined laterally; postocellar line slightly longer than the ocelloccipital line; antennæ eight-jointed, the last three joints not sharply defined; scutum and prescutum similarly punctured; scutellar lobe finely granular, with large punctures interspread; stigma straight below, oblique apically; sheath straight above, tapering from the pointed apex to the rather broad base. Black; clypeus, labrum, mandibles (apices piceous), spot on dorsal and ventral margins of pronotum, spot on scutellum, metepisternum, line on propodeum, lateral spots on two basal tergites, narrow apical margin of following tergites and sternites, four anterior femora beneath, four anterior tibiæ and tarsi (except dorsal apices of tibiæ), posterior tibiæ, except dorsal apices, hind tarsi more or less yellowish-white; pubescence of head black, that of thorax gray. Wings hyaline, slightly yellowish; venation dark brown, costa and stigma yellowish.

Colorado. One female from the C. F. Baker collection.

Type.—Cat. No. 14601, U.S.N.M.

Key to the Nearctic species of Labidia.

The following table is based on the females, as the male of only one species is known through specimens.

Ocellar basin distinct..... 1.

Ocellar basin obsolete..... 4.

1. Postocellar furrow obsolete; antennæ seven-jointed; scutellum and propodeum black .....*anomocerus.*

Postocellar furrow present; antennæ eight-jointed; scutellum and propodeum (in part) yellow..... 2.

2. Sheath obliquely rounded below; mesepisternum black; (hind femora black) *subnigriceps.*

Sheath subtruncate, rounded below; mesepisternum with a pale spot..... 3.

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Key to the Nearctic species of Labidia—Continued.

3. Hind femora pale beneath; dorsal walls of the ocellar basin rounded; ocellar basin finely granular ..... *opimus opimus.*
   Hind femora black; dorsal walls of the ocellar basin sharp; ocellar basin striato-granular ..... *opimus coloradensis.*
4. Mesonotum with three finely granular areas which contrast strongly with the coarsely punctured areas along the sutures; middle fovea obsolete; (mesepisternum and hind femora black) ..... *originalis.*
   Mesonotum uniformly, coarsely sculptured; middle fovea large, deep ..... 5.
5. Sheath truncate apically; postocellar area bounded laterally by a furrow *alienatus.*
   Sheath obliquely rounded below; postocellar area without lateral furrows *anomus.*

Genus TENTHREDELLA Rohwer.

TENTHREDELLA ELEGANTULA OBLIQUATA (MacGillivray).

Tenthredo obliquatus MACGILLIVRAY, Journ. New York Ent. Soc., vol. 5, Sept., 1897, p. 105.

Tenthredo elegantula oregana ROHWER, Proc. U. S. Nat. Mus., vol. 41, No. 1866, 1911, p. 411.

This subspecies varies in having the pectus black or with a pale spot. All the northern specimens differ from the southern ones, typical *elegantula*, in the entirely black prescutum. Specimens of *obliquata* determined by MacGillivray have been compared with the type of *oregana* and no differences of importance could be found.

Subfamily MESSINÆ.

NEOPOPPIA, new genus.

Belongs to Phyllotomini Rohwer. In Genera Insectorum *Neopoppia* runs to *Poppia* Konow, but differs from the descriptions of that genus in the deeply emarginate clypeus, the lateral ocelli being well below the supraorbital line, and the different venation of the hind wings. The genus *Poppia* Konow is known only through descriptions, but judging from these it probably belongs to the tribe Phyllotomini Rohwer.

Head transverse, posterior orbits narrow; eyes large, converging to the clypeus; malar space wanting; clypeus deeply emarginate; antennæ 9-jointed, pedicellum longer than the scape and much longer than wide, third joint longer than the fourth, basal joints hairy; thorax similar to *Caliroa* but rather more elongate; propodeal spiracle round and occupying the same position as in *Caliroa;* basitarsi III subequal in length with the following joints; claws with an erect inner tooth; wings differ from those of *Eriocampoides varipes* as figured by MacGillivray [1] in the transverse radius being interstitial with the second transverse cubitus, the basal vein not so strongly curved and more basad of the cubitus, and a few minor points.

Type.—*Neopoppia metallica* Rohwer.

[1] Proc. U. S. Nat. Mus., vol. 20, pl. 30, fig. 53.

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NEOPOPPIA METALLICA, new species.

Male.—Length 5.5 mm. Clypeus deeply arcuately emarginate, lobes obtusely triangular; supraclypeal foveæ deep, circular in outline; middle fovea large, walls sloping, elongate triangular in outline; ocellar basin present and almost connected with the middle fovea, almost quadrate in outline; antennal furrows shallow; the frontal foveæ large, with sloping walls; postocellar area sharply defined laterally, about twice as wide as the cephal-caudad length; postocellar furrow wanting; postocellar line subequal with the ocellocular line; front with distinct, separate punctures; vertex and posterior orbits with widely separated punctures; flagellar joints diminishing in length to the fifth where they become subequal; thorax smooth, shining; legs hairy, tibiæ III heavy, thickening apically; tarsal joints three and four on all tarsi produced within; stigma robust, strongly tapering from the transverse radius; transverse median somewhat basad of the middle of the cell; third cubital cell parallel sided, on the radius longer than second; hypopygidium broadly rounded apically. Metallic blue-black, the blue more marked on the head, the body more purplish; four anterior legs below apices of femora, and the base of tibiæ III whitish; wings hyaline, beyond base of stigma infuscate; venation dark brown.

Mount Salak, Java. One male collected May 15, 1909, by Bryant and Palmer.

Type.—Cat. No. 14502, U.S.N.M.

Subfamily EMPRIINÆ.

Genus TRICHIOTAXONUS Rohwer.

This genus belongs to the tribe Empriini. It may be readily separated from *Empria* by having the malar space wanting.

Genus SALATIGIA Enslin.

This genus belongs to the tribe Lycaotini.

Genus SENOCLIA Cameron.

Konow has placed this genus as a synonym of *Monophadnus* Hartig, but the following characters taken from the type of the genotype will serve to show that he is wrong in this.

Belongs to Blennocampini. Malar space wanting; eyes large, converging to the clypeus; clypeus truncate, slightly tapering apically; ocellar basin and antennal furrows present; lateral ocelli below the supraorbital line; scape somewhat triangular; pedicellum longer than wide, but broader at the apex; flagellum hairy, the first and second joints subequal; basal vein and transverse median interstital or nearly so; basitarsis III longer than the three following joints;

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tarsal claws with four inner teeth, the basal portion stout and subdentate apically so at some angles there appear to be five teeth.

The two species placed in *Senoclia* by Kirby certainly belong there.

A good series of *Senoclia caerulea* Cameron has kindly been given to the National Museum by Prof. E. E. Green.

SENOCLIDEA, new genus.

Related to *Senoclia* Cameron, but may easily be separated from that genus by the dentation of the tarsal claws, longer third antennal joint, and position of the transverse median. In the dentation of the claws, and venation *Senoclidea* is like *Parazarca* Ashmead, but may be readily separated from it by the metapleuræ (in *Parazarca* the metepisternum and metepimeron are about the same size, the wing process is composed of both plates, and is not an elongate single piece). *Nesotomostethus* Rohwer has the antennæ and metapleuræ different.

Belongs to Blennocampini. Clypeus truncate; malar space wanting; eyes converging to the clypeus; lateral ocelli below the supraorbital line; antennal furrows and ocellar basin present; antennæ thickening apically, third joint longer than the fourth, pedicellum widened apically, not much longer than wide; transverse median slightly basal of middle of cell; hind wings with one discal cell, the lanceolate cell with a long apical petiole; metepimeron smaller than the metepisternum; third wing process single, elongate, narrow; tarsal claws robust, cleft apically; basitarsis III subequal with the three following joints.

Type.—*Senoclidea amala* Rohwer.

SENOCLIDEA AMALA, new species.

Of the two species of *Senoclia* this is nearer *purpurata* (Smith), but the color of the legs will separate it from that species.

Male.—Length 8 mm. Supraclypeal foveæ poorly defined; middle fovea deep, large, walls straight, triangular in outline, the base of the triangle being above, and open below; antennal furrows nearly interrupted at the crest, but otherwise complete; ocellar basin well defined, not inclosed below, a deep fovea just below anterior ocellus; postocellar furrow present; postocellar area a little wider than long, defined laterally by foveæ rather than furrows; postocellar line much shorter than the ocellocular line; apical joints of the antennæ well defined, the apical joint nearly twice as long as the preceding, which is but little longer than wide; scutellum flat; stigma elongate, rounded below, truncate apically; third cubital cell longer than the second; transverse median a little basad of middle; tarsal claws deeply cleft and with a large, blunt inner tooth; hypopygidium broadly rounded apically. Blue-black, the abdomen pur-

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plish; clypeus and base of all the tibiæ (narrower on tibiæ III) whitish; wings dusky, darker apically; venation dark brown.

Depok, Java. One male collected by Bryant and Palmer.

Type.—Cat. No. 14503, U.S.N.M.

Monophadnus furvus Konow and *M. æger* Konow may belong to this group. The descriptions will not apply to the above insect.

SENOCLIDEA TERMINATA, new species.

Differs from *amala* in the color of wings, shape of stigma, and other characters.

Male.—Length 7 mm. Lateral angles of the clypeus obtuse; supraclypeal foveæ confluent with the antennal foveæ; supraclypeal area flat; middle fovea goblet shape; antennal furrows complete; ocellar basin triangular in outline, walls rounded; postocellar area well defined, about one and one-half times as broad as long; a furrow from the anterior ocellus to postocellar furrow; postocellar line much shorter than the ocellocular line; antennæ hairy to apex, the third joint a little longer than the fourth; stigma long, nearly parallel-sided, apex broadly truncate; transverse median in basal third of cell; hypopygidium broadly rounded apically. Blue-black; tibiæ externally white; wings hyaline; beyond base of stigma brown; venation black.

Los Banos, Luzon, Philippines. One male collected July, 1910, by E. M. Ledyard.

Type.—Cat. No. 14578, U.S.N.M.

SENOCLIDEA DECORA (Konow).

Monophadnus decorus KONOW, Wien. Ent. Zeit., vol. 26, 1899, p. 235.

Genus RHADINOCERAEA Konow.

RHADINOCERAEA LUCIDA, new species.

Agrees with the very brief description of *Rhadinoceraea similata* MacGillivray, but is smaller than that species.

Female.—Length 5 mm.; anterior margin of the clypeus truncate; supraclypeal foveæ deep, punctiform, not connected with the antennal foveæ; supraclypeal area evenly convex; middle fovea large, triangular, breaking through the crest above; antennal furrows sharply defined, complete; ocellar basin large, the walls sharply defined, triangular in outline with an indication of becoming heptagonal; postocellar line distinctly shorter than the ocellocular line; postocellar furrow sharply defined, angulate at middle; postocellar area more than three times as broad as the median length, sharply defined; antennæ rather short, scarcely tapering; head and thorax shining, nearly impunctate; stigma broader at the base, tapering to apex; transverse radius in apical fifth of cell; third cubital cell subequal in length

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with the first and second; third transverse cubitus angulate near middle, with a spurious vein; sheath narrowing apically, straight above, gently rounded below. Black, rather densely clothed with gray pubescence; wings infuscate, iridescent; venation black.

Dane County, Wisconsin. Female collected, May 20, 1909, by W. S. Marshall.

Type.—Cat. No. 14756, U.S.N.M.

Genus PARACHARACTUS MacGillivray.

PARACHARACTUS NEVADENSIS (Cresson).

Selandria (*Monophadnus*) *nevadensis* CRESSON, Trans. Amer. Ent. Soc., vol. 8, 1880, p. 13.

Female.—Length 8 mm. Anterior margin of the clypeus slightly incurved, shining; malar space very narrow; middle fovea large and joining the ocellar basin; antennal furrow present, but not continuous; postocellar furrow distinct, broadly V-shaped; lateral ocelli on the supraorbital line; antennæ rather slender, the third and fourth joints of equal length; head and thorax shining; scutellum with some large punctures, the lobe at the sides indistinctly granular; hind basitarsis equal to second, third, and fourth; stigma rounded, broader in the middle; the lower margin of the sheath rounded; claws with an erect inner tooth; the third cubital cell longer than first and second, receiving the transverse radius near the apex; venation of hind wings normal. Color black; labrum white; tegulæ, upper part of pleuræ and the mesonotum rufous; legs below the knees yellowish-white, the tarsi infuscated. Wings dusky, iridescent; venation black.

The above is a description of Cresson's type. This species also occurs in southern California.

PARACHARACTUS LEUCOSTOMUS, new species.

Female.—Length 8 mm. Very robust. Anterior margin of the clypeus nearly truncate, shining, covered with sparse punctures; ocellar basin and middle fovea confluent, but immediately around the anterior ocellus is a depressed area; postocellar area well defined, the postocellar furrow curved; lateral ocelli on the supraorbital line; head behind the supraorbital line shining and impunctate, the front with fine punctures; the third antennal joint slightly longer than the fourth, the fourth and fifth equal; mesoscutum highly polished; scutellum with separate punctures, the lobe polished, but with a few large punctures; sheath very broad, rounded strongly beneath; claws with a large inner tooth; stigma rounded on the lower margin, broader in the middle; third cubital cell as long as the first and second, receiving the transverse radius near the apex; radial cell of hind wings appendiculate. Color black; labrum, knees, and legs

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below white, the tarsi infuscated; pronotum, mesonotum, and tegulæ rufous. Wings hyaline, iridescent; venation black.

Claremont, California. Described from one female collected by C. F. Baker.

Perhaps this species is nearest to *nevadensis* (Cresson), but it is readily separated by the black mesopleuræ, as well as many structural differences.

Type.—Cat. No. 14557, U.S.N.M.

PARACHARACTUS NIGER, new species.

Female.—Length 5.5 mm. Not very robust. Clypeus longer in comparison to the length of the labrum than in any of the foregoing species, its anterior margin truncate; third antennal joint longer than the fourth, which is a little longer than the fifth; middle fovea very elongate and extending a good distance above the insertion of the antennæ; antennal furrows distinct and parallel to the middle fovea, not extending much higher on the head than the fovea; ocellar basin entirely wanting; posterior orbits narrow; postocellar area defined but not sharply so; head and entire thorax shining, almost impunctate; claws with an inner tooth; venation as in *leucostomus* except the stigma is angled at the base beneath; sheath rather robust, straight above, rounded below. Color black; legs below knees brownish; a very narrow margin of abdominal segments white. Wings hyaline, hardly iridescent; venation black.

Pasadena, California. Described from one female collected April 10, 1910, by F. Grinnell, jr.

Type.—Cat. No. 14558, U.S.N.M.

PARACHARACTUS CALIFORNICUS (Rohwer).

Neocharactus californicus ROHWER, Can. Ent., vol. 41, 1909, p. 89.

Type.—Cat. No. 14556, U.S.N.M.

The original description is erroneous in stating "nearer the base of the claw is another small tooth."

PARACHARACTUS NIGRISOMUS, new species.

Male.—Length, 4 mm. Anterior margin of the clypeus very shallowly, broadly, angulately emarginate, the surface convex, irregularly punctured; supraclypeal foveæ punctiform, not confluent with the antennal foveæ; supraclypeal area very short, gently convex; ocellar basin and antennal furrows obsolete; middle foveæ large, the dorsal walls sloping; frontal foveæ punctiform; postocellar area only defined by punctiform foveæ; postocellar line much shorter than the ocellocular line; antennæ short, stout, flagellar joints constricted basally, the third antennal joint longer than the two following; scutellum punctured like the scutum, lobe polished, impunctate; stigma short, angulate near base, tapering to apex; hypopygidium rather narrow, broadly rounded apically; transverse median distinctly basad of middle of

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discoidal cell. Black; apices of four anterior femora their tibiæ and tarsi (the tarsi are dusky), basal half of hind tibiæ white; the apical half of hind tibiæ and their tarsi brownish; wings hyaline, slightly dusky; venation dark brown, stigma pale brown.

Oxbow, Saskatchewan, Canada. One male collected June 21, 1907, by Frederick Knab.

Type.—Cat. No. 14499, U.S.N.M.

Genus NEOCHARACTUS Mac Gillivray.

NEOCHARACTUS MONTIVAGUS (Cresson).

Selandria (*Monophadnus*) *montivaga* CRESSON, Trans. Amer. Ent. Soc., vol. 8, 1880, p. 13.

Paratype.—Cat. No. 14555, U.S.N.M.

The teeth of tarsal claws are small.

Genus MONOPHADNUS Hartig.

MONOPHADNUS TRUNCATUS, new species.

Female.—Length, 5 mm. Anterior margin of clypeus truncate, surface with large, distinct punctures; supraclypeal area triangular, defined laterally by sutures slightly convex; supraclypeal foveæ deep, punctiform, not connected with the antennal foveæ; antennal furrows complete, except the interruption by the strong frontal crest; middle fovea elongate, sharply defined; ocellar basin triangular; postocellar area convex, more than twice as long as broad; postocellar furrow well defined; postocellar line very little shorter than the ocellocular line; scape globose; pedicellum with the apical width and length subequal; first joint of the flagellum subequal in length with the two following; scutellum more closely punctured than the mesoscutum, lobe shining in middle, finely striate laterally; stigma broadest near base, tapering to apex; sheath parallel sided, truncate apically, rounded below. Black; posterior angles of the pronotum narrowly, tegulæ, and legs below apices of femora white; wings slightly dusky, hyaline; venation dark brown.

Oxbow, Saskatchewan, Canada. One female collected June 1, 1907, by Frederick Knab.

Type.—Cat. No. 14553, U.S.N.M.

Genus PERCLISTA Konow.

PERCLISTA QUERCUS, new species.

Superficially like *albicollis* (Norton), *marginicollis* (Norton), and *purpuridorsum* Dyar, but may be easily separated by the emarginate clypeus. The black stigma is a good recognization character for this species.

Female.—Length, 5.5 mm. Anterior margin of the clypeus deeply, angulately emarginate, lateral lobes broad rounded apically, surface

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with distinct separate punctures; supraclypeal foveæ deep, punctiform, not confluent with the antennal foveæ; supraclypeal area rectangular in outline, convex; middle fovea triangular, more sharply defined above; ocellar basin large, extending to the crest, rounded below; postocellar area convex, slightly impressed medially, more than twice as wide as long; antennal furrows complete to near occiput where they are punctiform; third antennal joint longer than the fourth joint by about half the length of the fourth joint; scutellum more closely punctured than the scutum, lobe polished, shining; stigma long, angled near base, tapering to apex; sheath concave above, apex sharply pointed, obliquely truncate, lower margin broadening basally. Black; angles of pronotum, tegulæ, legs below coxæ white or whitish; lateral margins of prescutum, part of pronotum, upper part of meso-episternum, and sides of abdomen rufo-piceous. Wings hyaline, slightly dusky; venation black.

Male.—Length, 5 mm. Differs from the female in color as follows: Rufo-piceous markings wanting; legs largely piceous, paler at joints. Hypopygidium broadly rounded apically.

Forest Hills, Boston, Massachusetts. Females and males sent by Dr. W. M. Wheeler, who states that the insect "has been very destructive to one particular tree on the Bussey grounds, almost completely defoliating the lower branches." The tree is one of the white oaks, probably *Quercus macrocarpa.*

Type.—Cat. No. 14554, U.S.N.M.

PERICLISTA ALBICOLLIS (Norton).

Selandria albicollis NORTON, Trans. Amer. Ent. Soc., vol. 4, 1872, p. 85, male.—CRESSON, Trans. Amer. Ent. Soc., vol. 4, 1872, p. 155; vol. 8, 1881, p. 42.

Phymatocera albicollis KIRBY, List Hym. Brit. Mus., vol. 1, 1882, p. 165.—DALLA TORRE, Cat. Hym., vol. 1, 1894, p. 177.

Periclista albicollis DYAR, Journ. New York Ent. Soc., vol. 7, 1898 (June), p. 130.

The type of this species seems to be lost; at least it is not in Philadelphia or New Haven. A female from the Belfrage collection is in the National Museum. It agrees well with Dyar's determination of the species. In the foregoing discussion this is taken as the correct interpretation of the species.

Subfamily SELANDRIINÆ.

In some of the oriental members of this subfamily in which the thorax is black it appears on first examination that the prepectus is wanting, but by careful study or by the aid of a drop of chloroform it can be made out. The venation in those in which trouble has been experienced is that of *Stromboceros* and allies, so no trouble should be had. It may be that this group will be better divided on characters of the metapleuræ, but at present not enough of the genotypes are

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available for study, so attention can only be called to these characters. In *Strongylogaster* the third pleural suture is gently curved and the metepimeron is small. In *Selandria* the third pleural suture is angulate and the metepimeron forms an irregular L-shaped plate. In *Eustromboceros* the third pleural suture is subangulate, but the angulation is near the middle, and the two plates are of about the same size. In some genera when the metepisternum is large, as in *Selandria*, there is a cephal-caudad suture from near the middle of the coxa. Other differences have been noted, but these will suffice to show the variation in the metapleuræ and the possibility of it as a valuable character in classification. When sufficient material has accumulated, a tabular arrangement of these characters will be given.

Genus NESOSELANDRIA Rohwer.

NESOSELANDRIA CEYLONENSIS, new species.

Differs from *Nesoselandria imitatratrix* (Ashmead) in the different conformation of the head (more especially in the frontal area); the more strongly tapering antennæ; truncate stigma and other characters.

Female.—length 4 mm. Labrum truncate; clypeus truncate, lateral angles sharp; supraclypeal foveæ deep, confluent with the antennal foveæ; supraclypeal area large, flat; middle fovea, rather shallow, nearly circular in outline; frontal foveæ similar in shape to the middle fovea, but larger; from each lateral ocellus to the irregular frontal crest is a fine carina; postocellar area defined laterally by an elongate, punctiform fovea, otherwise not defined; postocellar line subequal with the ocellocular; occiput sharply defined; antennæ hairy, tapering apically, the third joint about one-fourth longer than the fourth; stigma broadest between the middle and the base, tapering to the narrowly truncate apex; sheath concealed. Black; tarsi white, infuscated. Wings brownish, hyaline; venation dark brown; hind wings paler than the fore wings.

Peradeniya, Ceylon. Female collected at light in September, 1911 (type); female collected April, 1902. Both received from E. E. Green.

Type.—Cat. No. 14577, U.S.N.M.

Paratype.—Returned to Prof. E. E. Green.

Genus NESOTAXONUS Rohwer.

Taxonus (*Nesotaxonus*) ROHWER, Proc. U. S. Nat. Mus., vol. 39, No. 1777, p. 111.

This genus was described as a subgenus of *Taxonus*, but belongs to the tribe Selandrini of the classification proposed in Proc. Ent. Soc. Wash., vol. 13, No. 4, p. 224.

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Genus STROMBOCEROS Konow.

For the time being it seems best to treat the various groups as subgenera rather than genera.

PROSTROMBOCEROS, new subgenus.

Differs from *Eustromboceros* Rohwer in the pedicellum being longer than wide; and in the third pleural suture being angulate dorsally, the metepimeron a narrow plate which is roughly L-shaped. (In *Eustromboceros* the third pleural suture is subangulate ventrally, and is near the central axis of the metapleuræ, so the two plates are of nearly the same size. On the metepimeron there is a posterior fold. The posterior coxæ have two processes.)

Type.—*Stromboceros* (*Eustromboceros*) *melanopterus* Rohwer.

STROMBOCEROS (PROSTROMBOCEROS) PLANIFRONS, new species.

Male.—Length 5 mm. Elongate, slender; supraclypeal foveæ confluent with the large antennal foveæ; supraclypeal area gently convex; middle fovea represented by a shallow, irregular depression; antennal furrows obsolete; frontal foveæ deep, circular in outline, separated from the eye by a distance slightly less than their width; ocellar basin obsolete; postocellar furrow wanting; postocellar area defined laterally by elongate foveæ, fully twice as wide as the cephalcaudad length; lateral ocelli well below the supraorbital line; posterior orbits narrow; antennæ long, filiform, pedicellum much longer than wide, and longer than the scape; thorax and legs normal; hypopygidium long, broadly rounded apically; stigma narrow, tapering apically; third cubital cell longer than the second. Black; five basal abdominal segments, four posterior legs (except apical joints of the tarsi), and the anterior legs below coxæ and except apical joints of tarsi, reddish-yellow; wings strongly infuscate; venation black.

Tjibodas, Mount Gede, Java, altitude 8,000 feet. Males collected by Bryant and Palmer.

Type.—Cat. No. 14504, U.S.N.M.

In the absence of the antennal furrows, ocellar basin, and narrow posterior orbits this species differers from the type of *Prostromboceros*.

Subgenus STROMBOCERIDEA Rohwer.

STROMBOCEROS (STROMBOCERIDEA) ALBIMACULATUS, new species.

Related to *pallidicornis* Rohwer, but the head is rather different, the stigma longer and the markings white.

Female.—Length 6.5 mm. Clypeus very gently, arcuately emarginate; supraclypeal foveæ elongate, deep but not sharply defined; supraclypeal area very slightly convex; middle fovea large,

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subquadrate in outline, deep, walls nearly straight; antennal furrows wanting; frontal foveæ elongate, punctiform; ocellar basin U-shaped, slightly broader just below anterior ocellus; postocellar furrow not complete; postocellar area defined laterally by furrows, fully twice as wide as the cephal-caudad length; postocellar line perhaps a little shorter than the ocellocular; pedicellum subequal in length with the scape; fourth antennal joint slightly longer than the third, antennæ slender; stigma long, tapering from near the base to apex which is narrowly truncate; transverse radius slightly basad of the middle of the cell; third cubital cell shorter than the second; first transverse cubitus incomplete; transverse median a little more than its length from the apex of the cell; sheath very broad, straight above, tapering to truncate apex-beneath. Black; clypeus, labrum, four apical and two basal joints of the antennæ, pronotum, tegulæ, first perapteron, large spot on dorsal margin of metepisternum, margin of the prescutum, scutellum, scutellar lobe, four anterior legs except bases of coxæ, and tarsi, posterior coxæ and trochanters, base of posterior tibiæ, abdomen except apical segments and sides of some ventral segments, whitish. Wings hyaline, iridescent; venation dark brown.

Tjibodas, Mount Gede, Java. One female collected September 10, 1909, by Bryant and Palmer at an altitude of 4,500 feet.

Type.—Cat. No. 14506, U.S.N.M.

NEOSTROMBOCEROS, new subgenus.

Clypeus distinctly arcuately emarginate; eyes gently converging to the clypeus; malar space wanting; front without an ocellar basin; lateral ocelli well below the supraorbital line; posterior orbits rather narrow; pedicellum wider than long; the third antennal joint longer than the fourth; third pleural suture angulate ventrally extending from coxal process in a cephal-caudad direction then curving to the wing process; metepisternum with a long dorsal arm; metepimeron large; basitarsis III somewhat shorter than the following joints; claws cleft, with inner tooth of the cleft larger than the outer; first transverse cubitus wanting; transverse median slightly beyond the middle of the cell; hind wing with two discal cells, lanceolate cell sessile.

Neostromboceros may easily be separated from the other subgenera of *Stromboceros* by the cleft tarsal claws.

Type.—*Stromboceros* (*Neostrombocerus*) *metallica* Rohwer.

STROMBOCEROS (NEOSTROMBOCEROS) METALLICA, new species.

Blue, abdomen with a reddish-yellow band, wings dark.

Female.—Length 8 mm. Supraclypeal foveæ confluent with the antennal foveæ; supraclypeal area flat; middle fovea elongate;

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antennal furrows present to the frontal foveæ which are circular in outline, and rather large; postocellar furrow wanting; postocellar area defined laterally by furrows, but little wider than the cephal-caudad length; ocelli in a low triangle; postocellar line not half as long as the ocellocular line; antennæ hairy wanting beyond the fifth joint; sheath very broad, short, truncate apically; calcaria short, stout, sharp, apex hyaline; stigma rounded beneath, transverse radius leaving it at its apex. Blue black; four basal abdominal segments reddish-yellow; antennæ and legs (except bases of tibiæ which are white) black; wings strongly fuscous, venation black.

Singapore, Malay Peninsula. One female collected February 25, 1909, by Bryant and Palmer.

Type.—Cat. No. 14505, U.S.N.M.

Genus STRONGYLOGASTER Dahlbom.

STRONGYLOGASTER REMOTUS, new species.

Wings hyaline; legs and abdomen red; mesonotum shining.

Female.—Length 6 mm. Clypeus transversely granulato-reticulate, gently, arcuately emarginate anteriorly; supraclypeal area flat ventrally, slightly convex dorsally; supraclypeal foveæ large, deep, circular in outline; middle fovea well defined, triangular in outline; frontal crest straight; ocellar basin triangular in outline, deep below the anterior ocellus, shining; antennal furrows nearly complete above the crest; postocellar furrow present; the postocellar area about twice as wide as cephal-caudad length; antennæ short, the third and fourth joints subequal in length; head shining; mesothorax impunctate, polished; scutellum much elongate, twice as long as wide; stigma angulate at base, strongly tapering to the apex; third cubital cell longer than the second; propodeum emarginate posteriorly. Black; angles of the pronotum, tegulæ, and knees whitish; sides of prescutum piceous; abdomen and legs below middle of coxæ reddish (apical, dorsal margins of the dorsal segments are slightly whitish). Wings hyaline, iridescent; venation dark brown.

Germantown, Pennsylvania. One female collected May 5, 1908. Received from H. S. Harbeck.

Type.—Cat. No. 14411, U.S.N.M.

STRONGYLOGASTER ALBOANNULATUS, new species.

Close to *annulosus* Norton, from which it may be separated by the third and fourth antennal joints being of equal length (in *annulosus* the third is longer); scutellum dull and without large punctures over the entire surface (in *annulosus* the scutellum is shining and with large, separate punctures over the surface); and in having the black of the abdomen replaced by red.

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Female.—Length 7.5 mm. Clypeus closely punctured, with a median carina, deeply, narrowly emarginate, lobes rounded apically; supraclypeal area elongate, strongly convex; supraclypeal foveæ deep, oval in outline; middle fovea large, shallow; frontal crest strong, unbroken; ocellar basin triangular in outline, not closed below, a triangular depression in front of the anterior ocellus; antennal furrows complete from the crest, but line-like near the occiput; postocellar area present, but weak; head finely punctato-granular, with large punctures on the front; antennæ short, the third and fourth joints equal in length; mesonotum finely granular, the sutures with large punctures (those of prescutum more dense); stigma robust, angulate near base, truncate apically; sheath with long hair, concave above, convex below, narrower apically. Black; palpi, angles of pronotum, tegulæ, narrow apical margins of all of the dorsal abdominal segments, knees and anterior tarsi yellowish-white; most of anterior femora, apical part of anterior tibiæ apical two-thirds of the four posterior tibiæ and all of their tarsi, base of abdominal segments reddish. Wings hyaline, iridescent; venation dark brown, apical half of stigma yellowish. Face with white pubescence.

Brown's Mills Junction, New Jersey. One female collected June 9, 1907. Received from Mr. V. A. E. Daecke.

Type.—Cat. No. 14410, U.S.N.M.

Subfamily NEMATINÆ.

Tribe HEMICHORINI.

Hemichronini ROHWER, Proc. Ent. Soc. Wash., vol. 13 (4), 1911, p. 225.
Hoplocampinæ ROHWER, Proc. Ent. Soc. Wash., vol. 13 (4), 1911, pp. 220 and 225.

The characters used to separate the Hoplocampinæ from the Nematinæ, in my recent paper, have been proven unsatisfactory. The Hoplocampinæ have therefore been merged with the Nematinæ, where they fall into the tribe Hemichorini. The subfamily character used in the paper was unstable in the genus *Pteronidea* and other genera of Nematinæ.

The Nematinæ as now recognized contains two types of larvæ, and some day satisfactory characters may be found in the adults which will separate them into two groups as indicated by the larvæ. Most of the aberrant larvæ belong to Hemichorini, although the Hemichorini also contains a few larvæ of the type found in the tribe Nematini.

Genus CRATEROCERCUS Rohwer.

CRATEROCERCUS FLORIDANUS, new species.

Related to *Craterocercus albidovariatus* (Norton) from which it may be separated by the following characters: Supraclypeal area rather narrow and strongly ridged; ocellar basin longer (dorsad-ventrad) than broad, the lower wall more sharply defined; stigma oblique.

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Female.—Length, 7 mm. Clypeus deeply squarely emarginate, the lobes subparallel sided, rounded apically; supraclypeal foveæ deep, incompletely confluent with the antennal foveæ; antennal foveæ poorly defined; antennal furrows broad shallow, nearly complete; middle fovea deep, nearly circular in outline; ocellar basin angulate above, below the anterior ocellus parallel-sided; postocellar area well defined, divided by a longitudinal furrow in the middle; postocellar furrow present, straight, well behind the ocelli, connected with the angulate portion of the ocellar basin; postocellar line somewhat longer than the ocellocular line; third and fourth antennal joints subequal; mesonotum sparsely punctured, the anterior part of prescutum and posterior part of scutellum with the punctures denser; scutellar lobe coarsely, closely punctured; second recurrent interstitial with the second transverse cubitus; sheath straight above, strongly tapering below from the rounded apex. Black; clypeus, labrum, mandibles (except piceous apices), four anterior legs, posterior tibiæ except apices pallid; pronotum, tegulæ, propodeum, three basal segments of the abdomen testaceous; margins of prescutum and scutellar lobe rufo-testaceous. Wings hyaline, slightly yellowish; venation pale brown, costa and stigma yellowish.

Male.—Length 7 mm. Ocellar basin not as well defined as in female; hypopygidium long, broadly rounded apically. Structural characters those of female. Differs in color from the female in having the following parts black: clypeus, labrum, mandibles, prescutum, scutellar lobe, and propodeum.

Biscayne Bay, Florida. A female and male.

Type.—Cat. No. 14593, U.S.N.M.

CAULOCAMPUS, new genus.

Belongs to the Hemichorini and is related to *Craterocercus* Rohwer from which it may be separated by the following characters: Tarsal claws with an erect inner tooth near the middle; head and thorax shining, not coarsely punctured; third antennal joint longer than the fourth; eyes elongate oval; transverse radius wanting.

Clypeus shallowly emarginate; malar space practically wanting; eyes elongate oval; face very broad; pentagonal area obsolete; lateral ocelli on the supraorbital line; antennæ stout, pedicellum longer than wide, third joint longer than the fourth; head and thorax shining, not strongly punctured; hind basitarsis much shorter than the following joints; tarsal claws with a small erect inner tooth; sheath long, slender; venation similar to *Hoplocampa* Hartig, except the transverse radius is wanting and the anal cell is more broadly contracted.

Superficially *Caulocampus* resembles *Hoplocampa*, not only in the adults but in the larvæ (both larvæ being internal feeders). The

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short malar space and absence of the transverse radius will readily separate *Caulocampus* from *Hoplocampa*.

Type.—*Priophorus acericaulis* MacGillivray.

CAULOCAMPUS ACERICAULIS (MacGillivray.)

Priophorus acericaulis MacGillivray, Can. Ent., vol. 38, 1906, p. 306.
Priophorus acericaulis Briton, Ent. News, vol. 17, 1906, pp. 313–321, pl. 15, figs. 1, 23.

Paratype.—Cat. No. 14594 U.S.N.M.

Tribe NEMATINI.

DINEURIDEA, new genus.

Belongs to the Nematini and is related to *Dineura* Dahlbom, from which it may easily be separated by the simple tarsal claws.

Clypeus emarginate; malar space present; lateral ocelli well behind the supraorbital line; pentagonal area poorly defined; venation like *Dineura;* hind basitarsis much shorter than the following joints; claws simple; last ventral segment of female emarginate in the middle; cerci long; sheath stout, of the normal type.

Type.— *Marlattia erythrothorax* Rohwer.

Genus EUURA Newman.

EUURA SERISSIMÆ, new species.

Runs to *Euura brachycarpae* Rohwer in the latest table to these insects, but may easily be separated by the smaller size, more sharply pointed sheath, and different conformation of the head.

Female.—Length, 3 mm. Clypeus broadly arcuately emarginate, lobes low and broadly rounded; supraclypeal foveæ not sharply differentiated from the large antennal foveæ; supraclypeal area rectangular in outline, strongly carinated; middle fovea elongate, well defined, breaking through the crest; antennal furrows obsolete; ocellar basin sharply defined, pentagonal in outline; postocellar area not defined; postocellar furrow present; postocellar line subequal with the ocellocular line; flagellum wanting; stigma tapering from near base to apex; lower discal cell of hind wings longer than the upper; inner tooth of claw shorter than the outer; cerci long, hardly tapering; sheath rather broad at base, tapering (above and below) to an acute apex. Black; clypeus, labrum, mandibles (apices piceous), supraclypeal area, narrow inner orbits, angles of pronotum, tegulæ, legs (except piceous hind tibiæ and tarsi), and ventral segments testaceous or paler; wings hyaline, iridescent; venation pale brown, costa and base of stigma pallid.

Toronto, Ontario, Canada. One female bred from galls made on the leaf petiole of *Salix serissima*, by A. C. Cosens.

Type.—Cat. No. 14573, U.S.N.M.

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EUURA NIGRELLA, new species.

Runs in the table to the species of this genus to *Euura orbitalis* Norton, but may easily be separated from that species by the color. Superficially, *nigrella* is like *serissimæ*, but the head and sheath are quite different.

Female.—Length, 3 mm. Clypeus rather deeply, arcuately emarginate, lobes broad, obtusely rounded; supraclypeal foveæ confluent with the rather large antennal foveæ; supraclypeal area nearly rectangular in outline (somewhat broader below), strongly convex; middle fovea deep, elongate, not breaking through the crest; antennal furrows complete from crest to near lateral ocelli; ocellar basin indistinct, bounded by low, rounded walls; postocellar area bounded laterally by the punctiform ends of the antennal furrows; postocellar furrow wanting; postocellar line much longer than the ocellocular line; third and fourth antennal joints subequal; venation normal; stigma rounded below; teeth of claws subequal in length; cerci long, not tapering; sheath nearly parallel sided, apex obliquely truncate. Black; clypeus, labrum, mandibles (apices piceous), supraclypeal area, tegulæ, legs below coxæ (except the infuscate apices of hind tibiæ and all of their tarsi) testaceous. Wings hyaline; venation brown, stigma paler.

Fort Erie, Ontario, Canada. One female from M. C. Van Duzee, collected April 7, 1910.

Type.—Cat. No. 14574, U.S.N.M.

Genus PONTANIA Costa.

PONTANIA CRASSICORNIS, new species.

Related to *Pontania robusta* Marlatt, but is less robust, the emargination of the clypeus is deeper and the frontal crest is stronger.

Male.—Length, 3.5 mm. Clypeus deeply, narrowly emarginate, the emargination about the same size as the lobes, which are broadly rounded; supraclypeal foveæ punctiform, confluent with the antennal foveæ; supraclypeal area rectangular in outline, narrow, strongly convex; antennal foveæ very large; frontal crest very strong; middle fovea elongate, well defined, but not deep; antennal furrows obsolete; ocellar basin represented by a depression in front of the anterior ocellus; postocellar area convex, slightly impressed in the middle; postocellar line longer than the ocellocular line; antennæ robust, the third joint slightly shorter than the fourth; stigma gently rounded below, oblique apically; venation normal, except the lower discal cell of the hind wings is much longer than the upper; inner tooth of claw shorter than the outer; procidentia much broader than long, rounded apically; hypopygidium long, tapering to a narrow point apically. Black; antennæ beneath, head below antennæ, orbits,

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obtusely rounded; supraclypeal area very strongly convex, appearing acute, much longer than wide; antennal foveæ large, sharply defined; middle fovea large, shallow, not inclosed above; ocellar basin wanting; an elongate fovea in front of anterior ocellus; antennal furrows complete; postocellar furrow incomplete; postocellar line slightly shorter than the ocellocular line; antennæ hardly tapering, the third and fourth joints subequal; stigma acuminate; inner tooth of claw slightly shorter than the outer; sheath as in *parva*. Black; clypeus, labrum, mandibles (except piceous apices), malar space, angles of pronotum and tegulæ white; legs below coxæ (except femora beneath and apices of tarsi which are black) reddish-yellow; superior orbits piceous; wings hyaline, venation pale brown, costa and stigma pallid.

Mountains near Claremont, California. One female collected by C. F. Baker.

Type.—Cat. No. 14485, U.S.N.M.

PONTANIA FOVEATA, new species.

Belongs in Marlatt's division *I* and is related to *agama* Rohwer, but may easily be separated by the transverse fovea above the crest.

Female.—Length 4 mm. Labrum truncate; anterior margin of the clypeus gently arcuately emarginate, lobes broad, rounded apically; supraclypeal foveæ small, punctiform, well separated from the antennal foveæ; supraclypeal area convex, rectangular in outline, more prominent above; middle fovea broad, shallow, open above and with a furrow extending to the transverse fovea which is above the crest; a small depressed area in front of the anterior ocellus; antennal furrows represented by a broad depressed area; postocellar area not defined; postocellar line much shorter than the ocellocular line; antennæ wanting beyond the second joint; stigma broadest near base, tapering to apex; venation normal; teeth of claws large, subequal; sheath normal. Black; clypeus, labrum, mandibles (apices piceous), malar space, angles of pronotum, tegulæ and legs, whitish; posterior, superior, and part of inner orbits testaceous. Wings hyaline, iridescent; venation pale brown, stigma pallid.

Mountains near Claremont, California. One female collected by C. F. Baker.

Type.—Cat. No. 14569, U.S.N.M.

PONTANIA NEVADENSIS var. NIGRIPECTA, new variety.

Differs from *nevadensis* in the black mesosternum and in having the mesepisternum in part black. The male also differs in the postocellar furrow, not being defined, the head being more dull and the third antennal joint being but slightly shorter than the fourth, antannæ not as long as head and thorax.

Mountains near Claremont, California. Four females and 12 males collected by C. F. Baker.

Cotype.—Cat. No. 14486, U.S.N.M., and in C. F. Baker's collection.

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Genus PTERONIDEA Rohwer.

Group TRILINEATÆ.

Marlatt in his Revision of North American Nematinæ, page 66, places *similaris* (Norton), *robiniæ* (Forbes) as synonyms of *trilineata* (Norton). An examination of the types of the species in question proves that they are distinct and may be separated by the following characters:

Lateral walls of ocellar basin obsolete; prescutum entirely pale; length 4.5 mm. *robiniæ*

Lateral walls of ocellar basin present; prescutum partly black; larger..... 1

1. Lateral walls of the ocellar basin meeting on the postocellar line, the anterior ocellus being inclosed in the basin..... *similaris*

Lateral walls of the ocellar basin meeting at the anterior ocellus, which is at the top of the basin forming part of the wall..... *trilineata*

PTERONIDEA ROBINIÆ (Forbes).

Type.—Cat. No. 14413, U.S.N.M.
Food-plant.—Robinia pseudacacia.

PTERONIDEA SIMILARIS (Norton).

Figured under name *trilineata*, pl. 14, fig. 28, Howard's Insect Book.
Type.—Cat. No. 14414, U.S.N.M.
Food-plant.—Robinia pseudacacia.

PTERONIDEA TRILINEATA (Norton).

Type.—In the collections of the American Entomological Society.
Food-plant.—Salix tristis.

Genus AMAURONEMATUS Konow.

AMAURONEMATUS KNABI, new species.

In the current classification this will fall near *lincolnensis* Rohwer, from which it may easily be separated by the shape of the sheath, better defined ocellar basin, and other characters.

Female.—Length 6 mm. Anterior margin of the clypeus deeply arcuately emarginate, lobes obtusely triangular; supraclypeal foveæ punctiform, deep, well separated from the antennal foveæ; supraclypeal area gently convex; middle fovea deep, elongate, breaking through the crest; ocellar basin well defined, the lower wall better defined; antennal furrows nearly complete, broadening at top; postocellar area gently convex, the anterior margin curved; postocellar line longer than the ocellocular line; antennæ of medium length, the fourth joint slightly longer than the third; scutellum with a longitudinal furrow, the scutellar lobe large, granular; stigma gently rounded below; venation normal; cerci long slender not tapering; sheath convex above, apex sharp, obliquely truncate below. Rufo-testaceous; antennæ, intraocellar area, spot on scutellum, first five tergal seg-

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ments in the middle and margin of sheath black; head below antennæ, angles of pronotum, tegulæ and legs luteous. Wings hyaline, iridescent; venation pale brown, costa and stigma pallid.

Oxbow, Saskatchewan, Canada. Two females, one June 19, 1907 (type), the other June 15, 1907, collected by Frederick Knab, for whom the species is named.

Type.—Cat. No. 14559, U.S.N.M.

In the paratype the intraocellar area and fifth tergal segment are pale.

Genus NEMATUS Panzer.

NEMATUS PROCIDENTIUS, new species.

Related to the European *Nematus crassus* Fallén, but may be separated by the rufous coxæ, white tarsi and different conformation of the procidentia.

Male.—Length 9 mm., slender; antennæ 8 mm. Labrum broadly rounded apically; clypeus deeply, arcuately amarginate, lobes broadly triangular; supraclypeal area gently convex; supraclypeal foveæ deep, oval in outline; middle fovea with sloping sides, rather deep and in middle circular in outline; ocellar basin pentagonal, lateral walls well defined, lower walls rounded; frontal crest produced, unbroken; postocellar line distinctly longer than the ocellocular line; postocellar area more than three times as wide as the cephal-caudad length; head with fine, irregular punctures; antennæ long, tapering, the third joint shorter than the fourth; prescutum with rather close, fine punctures, which become sparser on the scutum and practically wanting on the scutellum; stigma rounded below, apex tapering; first transverse cubitus wanting; legs normal; hypopygidium very long, obtusely triangular; last dorsal segment depressed on each side of the middle so the elevated portion is ⌒ shaped; procidentia scarcely produced, flattened apically; in the type the tenth dorsal segment is much produced. Black; legs except apical half of the posterior tibiæ (which are black) and the tarsi (which are whitish) red; tegulæ white. Wings clear hyaline, iridescent; venation dark brown.

Conewago, Pennsylvania. One male collected June 23, 1911. Received from Mr. V. A. E. Daecke.

Type.—Cat. No. 14412, U.S.N.M.

Family PTERYGOPHORIDÆ.

Genus ACORDULECERA Say.

In describing the antennæ of this genus it has been stated that they are six jointed. This is an error, as they are really seven jointed, there being a small joint between the pedicellum and flagellum (see figure 6*a* and 6*b*). In one of the species described below the two

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apical joints of the flagellum are so nearly consolidated as to appear as one joint. Magnification of 50 diameters shows the dividing suture. In the following descriptions the flagellum is considered to be the joints beyond the small ring-like joint.

The notauli are obsolete, or nearly so, the mesoprescutum is therefore very poorly defined.

ACORDULECERA DORSALIS Say.

I have accepted Doctor MacGillivray's determination of this species, and on this basis the records of the larva having been bred from black oak and hickory are in error, as will be seen by the references given to some of the following species.

a

b

FIG. 6.—ANTENNA OF ACORDULOCERA. *a*, ANTENNATA; *b*, BICLINIUS (EXCEPT THE SCAPE).

ACORDULECERA ANTENNATA, new species.

Separated from the other species of the genus by having the two apical joints of the flagellum nearly consolidated, so as to appear as one joint under ordinary magnification. The flagellum apparently three jointed.

Male.—Length 2.75 mm. Labrum angulate apically; middle fovea wanting; frontal furrow present; antennal furrows complete to ocelli; ocellar basin obsolete; a shallow depression at the side of each lateral ocellus; postocellar line much longer than the ocellocular line; first joint of flagellum longer than the second; hypopygidium truncate apically. Black; apex of clypeus, labrum, mandibles (except piceous apices), and legs yellowish-white. Wings hyaline; venation pale brown. Face without dense white pubescence.

Newington, Fairfax County, Virginia. One male collected May 30, 1911, by S. A. Rohwer.

Type.—Cat. No. 14416, U.S.N.M.

The following species all have the flagellum distinctly four jointed:

I. SCUTELLUM PALE.

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ACORDULECERA SCUTELLATA, new species.

Related to *mixta* MacGillivray but may be separated from that species by having the first joint of the flagellum distinctly longer than the second.

Female.—Length 3.5 mm. Labrum obtusely angulate anteriorly; middle foveæ wanting; frontal furrow present; ocellar basin present, but shallow; antennal furrows present to ocelli, where they broaden into a shallow depression; postocellar line much longer than the ocellocular line; first joint of flagellum distinctly longer than the second. Black; most of antennæ, clypeus, labrum, mandibles (apices piceous), legs, tegulæ, scutellum, venter and a dorsal spot on the abdomen yellowish-white. Face without dense pubescence. Wings hyaline, venation pale brown, with the stigma paler.

Male.—What may be the male has the hypopygidium truncate apically, and the frontal furrow deeper below. In one of the males the supraclypeal area is pale.

West Point, Nebraska. One female collected in June. Onaga, Kansas. One male collected by Crevecoeur. Sheffield, Alabama. One male collected August 15, 1909, by H. S. Barber.

Type.—Cat. No. 14417, U.S.N.M.

II. Scutellum black.

1. Ocellar basin present. (Frontal furrow present.)

A. Middle fovea present.

a. First joint of the flagellum distinctly longer than second

ACORDULECERA FOVEATA, new species.

Similar to *maura* MacGillivray, but that species has the middle fovea wanting.

Female.—Length 3.5 mm. Labrum angulate apically; antennal furrows complete to ocelli, where they form shallow depressions; postocellar line subequal with the ocellocular line. Black; apex of clypeus, labrum, mandibles (apices piceous), palpi, pronotum, tegulæ, legs (except hind tarsi), venter and a spot on the tergum yellowish-white. Wings hyaline; venation dark brown. Face fairly well clothed with white hair.

Male.—Length 3 mm. Similar to the female, but the pronotum, tegulæ, and abdomen are black, and the postocellar line is slightly longer. Hypopygidium truncate apically.

Great Falls, Virginia. One female and four males collected May 12, 1911, by S. A. Rohwer. Dixie Landing, Virginia. One female collected June 30 by C. L. Marlatt.

Type.—Cat. No. 14418, U.S.N.M.

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ACORDULECERA PARVA, new species.

Related to *foveata* Rohwer, but the postocellar line is one third longer than the ocellocular line; and the hind tarsi are pale.

Male.—Length 2.5 mm. Hypopygidium broadly rounded apically. Black; antennæ, clypeus, labrum, mandibles (apices piceous), and legs yellowish-white. Venation pale brown; wings hyaline. Face without white hair.

Fort Lee, New Jersey. Four males bred from larvæ collected on young leaves of black oak. Van Cortland Park, New York. One male bred from larvæ collected on young leaves of black oak. Larvæ collected in the spring. Collected and bred by Dr. H. G. Dyar.

Type.—Cat. No. 14419, U.S.N.M.

One of the males has transverse radii in both wings.

B. Middle fovea wanting.

b. Abdomen entirely rufo-testaceous.

ACORDULECERA ERYTHROGASTRA, new species.

Judging from the description this species is colored like *A. maxima* MacGillivray, but the ocellar basin of that species is said to be wanting and the relation of the antennal joints is different.

Female.—Length 4 mm. Labrum obtusely angled apically; clypeus subconvex; antennal furrows complete to the ocelli, where they end abruptly; postocellar line subequal with the ocellocular line; first joint of the flagellum somewhat longer than the second. Black; apical part of clypeus, labrum, mandibles (apices piceous) and legs (except hind tarsi which are brown) yellowish-white; pronotum and abdomen rufo-testaceous. Wings hyaline; venation dark brown, lower part of stigma pale brown. Face with rather dense white hair.

Great Falls, Virginia. One female collected May 12, 1911, by S. A. Rohwer. One female from Georgia.

Type.—Cat. No. 14420, U.S.N.M.

c. Abdomen black.

ACORDULECERA CARYÆ, new species.

Larva 6 *U* of DYAR, Can. Ent., vol. 27, 1895, p. 340.
Acordulecera dorsalis: DYAR, Journ. N. Y. Ent. Soc., vol. 5, p. 199.

Female.—Length 4 mm. Labrum rounded anteriorly; clypeus with the apical margin depressed, basally convex; supraclypeal area convex below, flattened above; frontal furrow long and at some angles the middle fovea seems to be present but it is not; antennal furrows complete to the lateral ocelli, where they form a shallow depressed area; a punctiform fovea on postocellar line behind the anterior ocellus; postocellar line very little longer than the ocellocular line; first joint of flagellum longer than the second. Black; clypeus, labrum, mandibles (apices piceous), palpi, legs (apical four joints of

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hind tarsi pale brown) yellowish-white. Wings hyaline; venation pale brown, costa darker. Face without dense pubescence.

Male.—Length 3.5 mm. Hypopygidium truncate apically. Hind tarsi all pale.

Fort Lee, New Jersey. Ten females and 1 male bred from larvæ collected September 3, 1895, on new shoots, from a stump of *Carya porcina* Nuttall (pignut hickory). Larvæ collected and adults bred by Dr. H. G. Dyar.

Type.—Cat. No. 14421, U.S.N.M.

ACORDULECERA NIGRATA, new species.

Related to *A. caryæ* Rohwer, but easily separated by the clypeus not being depressed apically.

Female.—Length 4.5 mm. Labrum angulate apically; clypeus uniformly convex; supraclypeal area flat; antennal furrows complete to lateral ocelli where they form shallow depressions; a punctiform fovea on the postocellar line behind the anterior ocellus; postocellar line longer than the ocellocular line; first joint of the flagellum longer than the second. Black; clypeus, labrum, mandibles (apices piceous), palpi, legs below bases of coxæ (except hind tarsi which are dark brown) yellowish-white. Wings hyaline (slightly dusky below stigma); venation pale brown, costa darker. Face without white hair.

North Fork of Swannonoa River, Black Mountain, North Carolina. Two females collected in May by N. Banks. Castle Rock, Delaware County, Pennsylvania. One female collected May 26, 1908. Received from V. A. E. Daecke.

Type.—Cat. No. 14422, U.S.N.M.

Paratype.—Collection of N. Banks.

2. Ocellar basin obsolete.

C. Middle fovea present. (First joint of the flagellum longer than the second.)

d. Postocellar line subsequat with the ocellocular line.

ACORDULECERA PORTLÆ, new species.

Related to *A. munda* MacGillivray, but may be separated by the entirely black abdomen and black pronotum.

Female.—Length 4 mm. Labrum obtusely angulate anteriorly; clypeus broadly depressed apically, basally convex; supraclypeal area flat; middle fovea elongate and nearly confluent with the distinct frontal furrow; antennal furrows complete to ocelli, where they form shallow depressions; apical two joints of the flagellum subequal. Black; apical margin of clypeus, labrum, mandibles (except piceous apices), tegulæ, legs (except the black hind tarsi), yellowish-white. Wings dusky hyaline; venation pale brown, costa darker. Face without dense pubescence.

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Newington, Fairfax County, Virginia. One female collected June 4, 1911, by S. A. Rohwer.

Type.—Cat. No. 14423, U.S.N.M.

e. Postocellar line longer than the ocellocular line.

ACORDULECERA NIGRITARSIS, new species.

Female.—Length 4 mm. Labrum rounded apically; apical margin of the clypeus broadly depressed; supraclypeal area flat; middle fovea oval in outline, and nearly confluent with the distinct frontal furrow; antennal furrows complete to ocelli, where they end abruptly; apical joint of the flagellum somewhat shorter than preceding. Black; clypeus, labrum, mandibles (apices piceous), palpi, tegulæ, narrow line on pronotum and legs (except the brown hind tarsi) yellowish white. Wings hyaline, iridescent; venation dark brown. Face with rather dense white hair.

Newington, Fairfax County, Virginia; one female collected May 30, 1911, by S. A. Rohwer. Brown's Mills Junction, New Jersey. One female collected June 22, 1907, received from Mr. V. A. E. Daecke. Michigan. Long Island.

Type.—Cat. No. 14424, U.S.N.M.

In some of the paratypes the venter is pale, otherwise they seem to be the same.

ACORDULECERA BASIRUFA, new species.

Similar to *nigritarsis*, but can easily be distinguished by the reddish-yellow spot at the base of the abdomen.

Female.—Length 4.5 mm. Labrum subangulate apically; apical margin of the clypeus depressed, basally convex; supraclypeal area flat; middle fovea elongate; frontal furrow poorly defined; antennal furrows distinct, terminating at the lateral ocelli in a fovea; apical joint of the antennæ shorter than the preceding. Clypeus, labrum, mandibles (apices piceous), palpi, tegulæ, legs (except brown hind tarsi), and base of the abdomen reddish-yellow. Wings dusky hyaline; venation pale brown. Face with rather dense white hair.

Jacksonville, Florida; one female from Ashmead's collection. Enterprise, Florida; one female collected May 9. Kansas; female from C. F. Baker collection.

Type.—Cat. No. 14425, U.S.N.M.

D. Middle fovea wanting. (First joint of the flagellum longer than the second, postocellar line longer than the ocellocular line.)

ACORDULECERA FLAVIPES, new species.

Related to *A. dorsalis* Say, as restricted by MacGillivray teste a specimen from him, but may be superficially separated by the absence of much hair on the face.

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Female.—Length 4 mm. Labrum rounded apically; apical margin of clypeus broadly depressed, basally convex; supraclypeal area flat; frontal furrow present; antennal furrows complete to ocelli, ending without depressions; apical joint of flagellum slightly longer than the preceding. Black; antennæ brown; clypeus, labrum, mandibles (apices piceous), palpi, legs, tegulæ, angles of pronotum, metanotum, base of abdomen, yellowish or yellowish-white. Wings hyaline; venation pale brown, costa darker. Face without white pubescence.

"Sawflies on Hickory." Probably from near District of Columbia. Alabama; two females from C. F. Baker collection.

Type.—Cat. No. 14426, U.S.N.M.

ACORDULECERA QUERCUS new species.

Acordulecera dorsalis DYAR, Can. Ent., vol. 27, 1895, p. 208 and 340.

Female.—Length 3 mm. Labrum obtusely angulate; apical margin of the clypeus depressed, convex basally; supraclypeal area flat; frontal furrow present; antennal furrows present terminating at the ocelli without depressions; apical joint of the flagellum longer than the preceding. Black; apex of clypeus, labrum, mandibles (apices piceous), palpi, tegulæ and legs yellowish-white. Wings hyaline, iridescent; venation pale brown, costa darker. Face with rather dense white pubescence.

New York? Three females bred from larvæ collected on young leaves of black oak. Collected and bred by Dr. H. G. Dyar. This may have been from Fort Lee, New Jersey.

Type.—Cat. No. 14427, U.S.N.M.

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[SCIENTIFIC RESULTS OF THE PHILIPPINE CRUISE OF THE FISHERIES STEAMER "ALBATROSS," 1907–1910.—No. 22.]

PRELIMINARY ACCOUNT OF ONE NEW GENUS AND THREE NEW SPECIES OF MEDUSÆ FROM THE PHILIPPINES.

By HENRY B. BIGELOW,
Of the Museum of Comparative Zoölogy, Cambridge, Mass.

The Medusæ described below were collected by the Fisheries steamer *Albatross* among the Philippine Islands during 1907–1910. A complete account of the collection, with figures, is now in preparation.

Genus PROTIARA Haeckel, 1879.

PROTIARA TROPICA, new species.

Station 5500, 200 fathoms, August 4, 1909, one specimen 9 mm. high by 9 mm. in diameter; the tentacles 3 mm. long.

In general appearance the specimen is so *Sarsia*-like that until I examined the gonads I referred it to that genus. Perhaps other *Protiaras* have passed as *Sarsias*, and thus escaped notice. The gelatinous substance is thick, the subumbrella cavity comparatively small, and higher than broad.

Tentacles.—There are four simple, hollow radial tentacles, the lumen of each being so large that it is easily seen on dissection. The tentacles are cylindrical and have no distinct basal swellings. There are no ocelli, either axial or abaxial, nor are there any pigment granules at the tentacle-bases.

Canals.—The margins of the canals, both radial and circular, are smooth, and all are rather narrow. In a *Sarsia* such a conformation might be taken for granted, but among the Pandeidæ their edges often show diverticula of one shape or another.

Manubrium and gonads.—The manubrium extends to about the mid-level of the bell cavity, but it is evidently somewhat contracted. The mouth is surrounded by a simple lip which is not crenulated or folded but merely slightly quadrate. As seen aborally the manubrium is distinctly cruciform, there being four prominent radial longitudinal ridges extending from the base nearly to the mouth opening.

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The structure of the gonads, whether ring-like or not, can not be determined from surface views. I therefore sectioned the middle part of the manubrium in the transverse plane. On such a section it is evident that there are eight distinct sexual masses, the development of the genital products, in this case spermatozoa, being entirely discontinuous both in the per- and in the interradii. Apparently the gonads become continuous in the *interradii* at the base of the manubrium. But I could not determine this absolutely, not wishing to section the whole of this unique specimen. Judging from other Pandeids, such a condition might be expected. Probably here, as in *Tiara*, the adradial masses are fundamentally the arms of four interradial "horseshoes." In the lower (distal) part of the manubrium the interradial gap becomes broader and broader. The sexual products are far developed, if not mature. The sections show no trace of interradial entodermal septa such as Linko [1] described.

Color.—In the preserved specimen the manubrium and gonads are a faint yellow, otherwise it is colorless.

The various descriptions of the Atlantic *Protiaras* are so meager that it is not easy to determine whether or not the present specimen is identical with any of them. It is easily separated from Linko's specimen (*P. beroe* ?), the only one of which we have adequate knowledge, by the structure of gonads and manubrium. According to Linko the gonads are interradial, interrupted in the perradii but not in the interradii, and there are four longitudinal interradial entodermal septa which partially subdivide the cavity of the manubrium in its upper portion. As noted above there are no septa in the Philippine form and its gonads are interrupted in the inter- as well as in the perradii. The other accounts of the gonads in forms with four tentacles are vague. According to Hæckel [2] these organs are perradial, and Hargitt's [3] figure shows four perradial swellings in his *Protiara hæckeli*. But, to illustrate the unreliability of surface views as evidence for the location of the gonads of this genus, I need only point out that I would undoubtedly have described them either as continuous, or as perradial in *tropica*, had I not studied them on sections.

A difference which may serve to separate *tropica* from *borealis* is the presence of exumbral nematocyst clusters and of terminal tentacular knobs in the latter, and their absence in the former. In both these respects *hæckeli* agrees with *tropica*, but the account of it is meager and it is doubtful whether it belongs to the family at all. The previous records of the genus are all from north temperate or arctic regions. The discovery of a tropical representative is therefore especially interesting.

Type.—Cat. No. 29380, U.S.N.M., from the locality given.

[1] Zool. Anzeiger, vol. 25, 1902, p. 162.
[2] Das System der Medusen, 1879.
[3] Medusæ of the Woods Hole Region. Bull. U. S. Bureau of Fisheries, vol. 24, 1905.

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Genus ZYGOCANNA Hæckel, 1879.

Zygocanna HÆCKEL+*Zygocannota* HÆCKEL+*Zygocannula* HÆCKEL.

Mayer[1] has summarized our vague knowledge of this, up till now problematical, genus. Its distinguishing feature among Æquorids is the fact that its canals bifurcate. Hæckel's accounts, taken from alcoholic material, are incomplete and the condition of his specimens preclude accuracy. Probably his three "species" and the *pleuronota* of Péron and Lesueur are identical.

The Philippine specimens can be described as having branched canals, and it is for this reason that I refer them to *Zygocanna*. But the branching takes place proximal to the margin of the stomach instead of at the margin of the stomach, as Hæckel describes it, and, as in *Octocanna*, the canals can be traced inward over the roof of the gastric cavity to its center, a feature not previously known for any Æquorid. The branching, moreover, is much less regular than Hæckel deemed it, and the subumbrella surface is studded with gelatinous papillæ so prominent, even in an alcoholic specimen, that Hæckel could hardly have overlooked them had they been present in his material.

These facts combined are sufficient grounds for the institution of a new species. The only known medusa with which they may be identical is a young unnamed Æquorid figured and described from the collection of the *Siboga* by Maas.[2]

ZYGOCANNA VAGANS, new species.

Æquoride juv. gen.? sp.? MAAS, Die Craspedoten Medusen der *Siboga*-Expedition, 1905, p. 44, pl. 4, figs. 22, 23.

Station 5124, 281–0 fathoms, 1 specimen, 36 mm. in diameter.

Station 5190, 295–0 fathoms, 1 specimen, 39 mm. in diameter (type), and 9 other fragmentary specimens from 28–30 mm. in diameter.

Station 5216, 215–0 fathoms, 2 specimens, 76 and 68 mm. in diameter; in fair condition.

The bell is flat; the gelatinous substance thin but stiff, especially in an alcoholic specimen.

The most interesting feature is the structure of the stomach and of the canals. From the edge of the stomach to the margin of the bell the canals run direct, without branching or anastomosis; the branching is to be seen within the outer margin of the manubrium. At the center there is a cruciform figure, exactly as in *Irenopsis* and *Octocanna*, which can be reduced to four primary arms, though often irregular, and especially so in the type. Passing outward from the center the canals (or rather the lines on the roof of the manubrium, which represent their location at early stages) branch dichotomously, each main trunk, with its descendent branches, bifurcating three or

[1] Medusæ of the World, vol. 2, 1910.

[2] Die Craspedoten Medusen der *Siboga*-Expedition, 1905.

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four times. The outermost branching is close to the margin of the stomach and is obscured by the lips. In the type there are 38 canals resulting from the bifurcating of the four primary ones.

As a result of this method of branching, the canals are in groups. The number of groups varies according to the number of branchings which each main stem has undergone, and the number of canals varies from group to group. In the type the "cross" is so irregular that it is hard to determine which trunks are the four primary ones. But in another specimen, in which the features are more regular, there are 10, 5, 7, and 7 canals, originating from each of the four primary trunks, respectively. In another there are 9, 12, 5, and 8. In the two young Æquorids described by Maas, which probably belonged to this species, the central cross is quite regular, and in each specimen there are 32 definitive canals.

The canal-stripes within the limits of the stomach are the visible evidence of lines along which the upper (outer) wall of the manubrium is now attached to the subumbrella. Between these lines it hangs loose, leaving spaces into which a probe can be inserted, or an air bubble injected. Consequently it is easily stripped off, and all the specimens show more or less damage of this sort. Maas doubts whether the conditions in his specimen, which are essentially similar to those here outlined, are to be explained as the result of the branching of primary simple canals, or whether the numerous canals arise directly from the base of the stomach which grows laterally sinously ("sinos"). The complexly branched figure seems to indicate the former. The difference between these two concepts is more apparent than real, for the specimens show that the "branching," that is, the growth of new centrifugally formed canals, takes place from the margin of the manubrium at the points whence the preexisting canals emerge from it. The manubrium itself broadens as so many sinuses along the successively formed canals. A still further specialization would be branching of canals outside the margin of the manubrium, such as Hæckel has described.

Marginal organs.—The numerical relations of tentacles and canals and the proportional size of the stomach are given in the table for seven specimens:

Diameter.	Diameter of stomach.	Canals.	Tentacles.
mm.	mm.		
76	(?)	38	About 70
68	25	45	About 50
50	.....	31	About 45
43	18	46	46
40	20	35	42
39	18	38	54
36	13	29	28
29	12	33	42

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In the type the tentacles are arranged rather irregularly, some opposite canals, some between canals, some canals without tentacles. But in the specimen 36 mm. in diameter they are all opposite canals. The table shows that tentacles range from about as numerous as canals to almost twice as many. The tentacular bulbs are not laterally flattened, but cylindrical and stout. They have no spurs clasping the exumbrella, though they are truncate basally.

In addition to tentacles the margin bears a large number of rudimentary knobs. In one specimen in which I could count them approximately there were 29 canals, 28 tentacles, and about 110 knobs: 6, 4, 4, 11 between four successive pairs of tentacles. The very large number of bulbs contrasted with the invariably rather small number of tentacles shows that at least most of the former remain permanently rudimentary. Both tentacles and knobs bear excretory papillæ. These are unusually long, so that at first sight I took them for a third class of tentacles. But examination reveals their true nature. In all the specimens they are of the same remarkable proportions; the character, then, is constant enough to be a helpful field mark to the species.

The otocysts, of the usual closed type, are extremely numerous, from 0–3, usually 1 or 3 between every two bulbs, or bulb and tentacle, as the case may be. This indicates a total number of upward of 200, but I have not been able to count them all in any specimen. Each contains 1–3 otoliths. They are all so small that photographs do not show them, but they are easily made out in the specimens themselves.

Gonads.—The sexual glands are of the usual Æquorid type.

Subumbrella sculpture.—This is one of the most characteristic features of the species, one shared by but few other Æquorids (as *Æquorea grœnlandica*). The central two-thirds of the disk is lenticular; the outer third hangs down; the sculpture is restricted to the former. Between every two canals there is a longitudinal row of stout gelatinous papillæ, conical and very stiff. The largest number counted in any one row was 15; the usual number is from 5–10; I once saw as few as 4. In the region of the manubrium these papillæ are represented by rounded knobs occupying the spaces between the canal-stripes. The number of knobs is variable; in one example there were 16. The upper wall of the stomach is often torn away where it covers them. When, as in the type, this is not the case, it is not possible to count them.

The preserved specimens are colorless.

The *Siboga* specimens were taken in Malay Archipelago. The early records of the genus are from New Guinea and from the Straits of Sunda.

Type.—Cat. No. 29388, U.S.N.M., from *Albatross* station 5190.

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NAUARCHUS, new genus.

The three specimens on which this new genus is based are extremely interesting, for while their relationship to the Olindiinæ is patent, the gonads are of the Geryonid type, and the manubrium is suggestive of that organ among Halicreasidæ, a conformation without parallel among Petasidæ.

The genus may be defined as Petasidæ with 6 radial canals, but without centripetal canals; manubrium short and flat, without distinct gastral portion; mouth surrounded by a simple circular lip; gonads leaflike; tentacles of one kind only, corresponding to the primary tentacles of *Olindias*, their basal ends lying in furrows of the gelatinous substance so that they appear to emerge from the exumbrella; with terminal nematocyst swellings; otocysts free clubs, between the bases of the tentacles and the exumbrella.

Type of the genus.—*Nauarchus halius*, new species.

NAUARCHUS HALIUS, new species.

Station 5456, 120–0 fathoms, 3 specimens, the largest 12 mm. in diameter, the other two smaller, but too contracted for measurement. All three are so badly crumpled that it is impossible to make a photograph of the general habitus. But all were well preserved anatomically. The largest specimen may be taken as the type.

The gelatinous substance is thick centrally, thinner near the margin, the bell cavity shallow (at least after preservation). The velum is unusually broad; its circular muscles well developed. In general appearance the specimen strongly suggests a Halicreid, as, for instance, *Homœonema alba*. And the likeness is heightened by the gastric system.

The manubrium is small, 3 mm. in diameter; hexagonal in outline, its lower wall hardly at all pendent; the mouth surrounded by a simple thickened circular lip.

There are six broad radial canals, subtending equal arcs of the bell margin. The six gonads occupy the greater length of the radial canals, though leaving their extremities, distal and proximal, free. They are flat and leaflike, exactly like the corresponding organs in *Liriope*, and oval in outline. The specimen is apparently a male.

Marginal organs.—There are 12 solid tentacles, 6 radial and 6 interradial. The radials are larger, and one of the interradials is so small, that it was obviously formed very recently. Only two large tentacles are intact throughout their length, and both of these are interradials. For over four-fifths of their length they are smooth-walled, but near their ends they bear a series of about 20 prominent annulations, composed of nematocysts, and at the tip there is a prominent subspherical knob of closely crowded ectodermic cells radially arranged. But this is not flattened to form a "sucker," as in *Gonionemus*. (The

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tentacle tips thus agree with those of *Gossea*, and more closely with the secondary than with the primary tentacles of *Olindias*, though the tentacles themselves are homologues of the latter. All the other tentacles are broken short off, except two of the radials, which have apparently suffered the same fate, but regenerated at the tips. On the young tentacle no terminal annulations or knobs have developed yet. The tentacles arise from the margin, but curve upward against the bell, where they lie in furrows of the exumbrella. A slight distance above the margin they bend outward, away from the bell. This is a condition very much like what we find in *Heterotiara*. In *Olindias*, and especially in *Olindioides*, the basal parts of the tentacles have become entirely inclosed by the gelatinous substance, so that these organs actually do emerge from the exumbrella, but in *Nauarchus* the furrows remain open permanently.

Otocysts.—There is a single otocyst close beside each tentacle, lying within the exumbrella furrow, which sheaths the tentacle, but standing free instead of being inclosed in the gelatinous substance. The sense organ itself is a naked club, much like the corresponding organ in *Amphogona*, or *Aglantha*, except that it is nearly spherical. The covering layer of ectoderm can easily be distinguished from the entodermic core. In the only otocyst which was in perfect condition, or which I could study, this entoderm core consists of four large spherical, somewhat flattened, cells, each containing a small central mass which, judging from its high index of refraction, is the calcareous concretion.

Color.—All three specimens are colorless, at least after preservation, and very transparent.

The above description, taken from the type, applies very well to one of the other specimens also. But the remaining one is abnormal, so far as gonads and radial canals is concerned. Three of the canals, with their gonads, are of the normal type, but the other three are represented by a single trunk leaving the margin of the manubrium. This soon divides into three, each of which bears a gonad, leaflike in form but of rather less than normal size. Two of the resultant canals run to the margin, but the third ends with the end of the sexual gland. The specimen has 13 tentacles, two interradials in one sextant, one of them very small. Such an aberrant specimen is less surprising in this genus than it would be in some other families, for even more remarkable examples have been recorded for *Gonionemus*. Canals, gonads, and manubrium all vary to an extraordinary degree in these genera.

The foregoing account shows that this new genus does not fit in very well either with Mayer's [1] definition of Olindiidæ as having, Petasinæ as lacking, sucking disks on the tentacles, for though the structure of the margin shows unquestionable affinity with such genera as *Gonionemus* and *Olindias* the terminal knobs on the tentacles

[1] Medusæ of the World, vol. 2, 1910.

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are mere swellings; there is nothing in their structure to suggest that they exercise a suctional function. But even if they do not support Mayer's scheme, they do not fit any better in the system proposed by Browne[1] and adopted by me[2] in which the criterion separating the two subfamilies is the structure of the sense organs, whether vesicles, either external or internal, or clubs; because though allied to Olindiinæ, they have free sense clubs. In short, it is intermediate between the two subfamilies.

Type.—Cat. No. 29365, U.S.N.M., from the locality given.

[1] Hydromedusæ, in Fauna and Flora of the Maldive and Laccadive Archipelagoes, vol. 2, 1904.
[2] Mem. Mus. Comp. Zoöl., vol. 37, 1909.

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NAMES APPLIED TO THE EUCERINE BEES OF NORTH AMERICA.[1]

By T. D. A. Cockerell,
Of the University of Colorado, Boulder.

INTRODUCTION.

The Eucerinæ are bees of the family Anthophoridæ, in which the paraglossæ are very long and hairy. The antennæ of the males are usually very long, and the two sexes generally differ much in appearance. No fossil eucerine bees are known; *Calyptapis* from Florissant, at first supposed to belong here, proves to belong to the Bombidæ.[2] At the present time the subfamily is richly represented in the nearctic and palæarctic regions, and is also quite abundant in the neotropical (especially southward). In Africa it is widely scattered, but the species are not very numerous. In the Indian and Chinese regions there are rather numerous species, mostly, however, from the borders of the palæarctic. In the Malay and Austromalay regions they are absent; they are also absent from Australia and New Zealand, as well as from the islands of the Pacific and the Indian Ocean. Supposed species of *Tetralonia* recorded from Australia seem to belong to the nomiine group *Reepenia* of Friese.

The holarctic *Tetralonia*, with three submarginal cells in the anterior wings, and six-jointed maxillary palpi, must be regarded as the basic type of the subfamily. From this has arisen the palæarctic *Eucera*, with only two submarginal cells. This now well-defined group may have originated in a "mutation," for a specimen of *Tetralonia acerba* taken by Mr. G. Hite, at Boulder, Colorado, has only two submarginal cells on each side, and would be referred to *Eucera* were it not evidently an aberrant specimen of a well-known species of *Tetralonia*.[3]

[1] The asterisk (*) indicates that the species is in the collection of the United States National Museum. Certain few specimens sent to the Museum by Prof. T. D. A. Cockerell and labeled cotypes are considered paratypes, as Prof. Cockerell uses the name "cotype" in the same sense in which the Museum uses "paratype." The Museum has a goodly lot of unworked material in this group and when this has been determined the number of species in this collection will be greatly increased. Of the 261 names in the following list, 79 are represented by specimens in the collection. Of this 79, 26 are types or paratypes.—S. A. Rohwer.

[2] Ann. Mag. Nat. Hist., Oct., 1906, p. 324.

[3] University of Colorado Studies, 1907, p. 256, vol. 4.

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Another line of modification is observed in the reduction of the number of joints in the maxillary palpi. This has evidently gone on independently in the New and Old Worlds, by a process of parallel evolution, which might be described as orthogenetic. In the case of the forms with five-jointed maxillary palpi, it is questionable whether *Xenoglossodes* of America and the Old World *Tetraloniella* should be kept apart. *Melissodes* of America is represented by *Melissina* in India, both having four-jointed maxillary palpi. The neotropical *Thygater*, with three-jointed maxillary palpi, is represented by *Thygatina* in Ceylon. In South America is a genus *Melissoptila* Holmberg, with rather numerous species, having the maxillary palpi only two-jointed.[1] According to the theory of successive radiation[2] it may be maintained that the true evolutionary center of the Eucerines is neotropical, a suggestion which gains some support from the apparent absence of the group in the Tertiary strata of Europe and North America. On the other hand, the apparent stem-form *Tetralonia* is not only especially abundant in the holarctic, but appears on the wing earlier in the year than *Melissodes*, etc., being apparently adapted to cooler conditions. We also have the Asiatic series with the palpal joints reduced to four and three, and there is surely no reason to suppose that in the Old World the group had a southern origin.

The North American Eucerines were last catalogued in the Transactions of the American Entomological Society.[3] Since that time numerous species have been added, and a few changes in nomenclature made. The present list gives the type-localities, which were omitted in the former one, and also the collectors of the types when known. There are also added references to the principal synoptic tables.

LIST OF SPECIES.

Genus TETRALONIA Spinola.

Type.—*Macrocera malvæ* (Rossi)=*antennata* (Fabricius).

Maxillary palpi six-jointed.

This genus is also well represented in the Old World.

Eusynhalonia Ashmead, type *Eusynhalonia edwardsii* (Cresson), is a name for the slightly differentiated group including this and its allies.

Synhalonia Patton has for its type *Tetralonia* (*Melissodes*) *fulvitarsis*.

TABLES.

(1) Cockerell. Trans. Amer. Ent. Soc., vol. 32, 1906, pp. 74–91. (Species discussed in connection with the tables are included.)

(2) Cockerell. Trans. Amer. Ent. Soc., vol. 32, 1906, pp. 94–96. (Three short tables.)

(3) Cockerell. Trans. Amer. Ent. Soc., vol. 32, 1906, p. 114 (females).

(4) Robertson. Trans. Amer. Ent. Soc., vol. 31, 1905, pp. 366–367. (Illinois species.)

[1] Bertoni and Schrottky, Zool. Jahrbüch, 1910, p. 587.

[2] Nature, Aug. 6, 1908, p. 319.

[3] Vol. 32, 1906, pp. 101–104.

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acerba CRESSON, 1879. Nevada (Morrison). Tab. 1.

actuosa CRESSON, 1878. California (Hy. Edwards). Tab. 1, 3.
Male; Bull. S. California Acad. Sci., Feb. 1905, p. 30.

albicans PROVANCHER, 1896. Los Angeles, California (Coquillett).
Described from the male. "Bien distincte de *l'albata* Cresson, par sa taille plus petite, les bandes blanches de l'abdomen plus distinctes, etc." (Provancher).

albopilosa FOWLER, 1899. Berkeley, California (Fowler).

angustior COCKERELL, 1897. Pasco, Washington State (Kincaid).
Identical with *edwardsii*.

annæ COCKERELL, 1906. Gibson, New Mexico (Anna Gohrman). Tab. 3.

argyrophila COCKERELL, 1909. Lee County, Texas (Birkmann.)

astragalina COCKERELL, 1905. Boulder, Colorado (W. P. Cockerell). Tab. 1.

* **atriventris** SMITH, 1854. "North America?" Tab. 1.

* **belfragei** CRESSON, 1872. Texas (Belfrage). Tab. 1, 4.
"Distinguished at once (female) by the three beautiful, rather broad, snow-white bands on abdomen" (Cresson). Mr. J. C. Crawford notes that female *T. belfragei* from Dallas, Texas, has the hair on basal joint of hind tarsi within deep red or inclining to sooty; in certain lights most show it distinctly reddish.
Type.—Cat. No. 1790, U.S.N.M.

birkmanniella COCKERELL, 1906. Fedor, Texas, April 1 (Birkmann). Tab. 2.

californica CRESSON, 1878. California (H. Edwards). Tab. 1.
Male "closely resembles *edwardsii*, but easily separated by the longer third joint of antennæ, and differently formed intermediate tibiæ and tarsi" (Cresson).

californica FOWLER, 1899. Berkeley, California (Fowler).
Name preoccupied: = *fowleri*.

chrysobotryæ COCKERELL, 1908. Boulder, Colorado, May 2 (G. M. Hite).
Visits *Chrysobotrya*.

cordleyi VIERECK, 1905. Corvallis, Oregon (Cordley). Tab. 1, 2.

* **crenulaticornis** COCKERELL, 1898. Prude's Summit, Ruidoso, New Mexico. (C. M. Barber).
Type.—Cat. No. 13190, U.S.N.M.

crenulaticornis maculata COCKERELL, 1898. Big Rock, Ruidoso, New Mexico (Townsend).
Male variant, with small yellow spot on base of mandibles.

cressoniana COCKERELL, 1905. Texas. Tab. 1, 3.

dilecta CRESSON, 1878. "Texas (Belfrage); Colorado (Ridings)." Tab. 1, 2, 4.
This is the *T. speciosa* of Tab. 4.

donata CRESSON, 1878. Mexico (Sumichrast). Tab. 1 (p. 85), 3.

douglasiana COCKERELL, 1906. Steamboat Rock, Grand Coulee, Washington.

dubitata CRESSON, 1878. Georgia. Tab. 4.
This name has been used for *Tetralonia atriventris;* the genuine *dubitata* is a valid species of *Melissodes*.

* **edwardsii** CRESSON, 1878. California (H. Edwards). Tab. 1.

* **edwardsii vagabunda** COCKERELL, 1906. Boulder, Colorado (W. P. Cockerell). Tab. 2.

fedoris COCKERELL, 1906. Fedor, Texas, May 5 (Birkmann). Tab. 2.
Perhaps a variety of *T. rosæ*.

flagelliconis SMITH, 1879. Oaxaca, Mexico.
Notes on type: Trans. Amer. Ent. Soc., vol. 31, p. 326.

* **fowleri** COCKERELL, 1905. Los Angeles, California (Davidson).
Allied to *T. belfragei*.
Paratype.—Cat. No. 15068, U.S.N.M.

frater CRESSON, 1878. Colorado (Morrison). Tab. 1, 2.

* **frater aragalli** COCKERELL, 1904. Colorado Springs, Colorado (Cockerell). Tab. 2.
Probably the female of *fulvitarsis*; Canadian Entomologist, 1908, p. 234.

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fulvitarsis CRESSON, 1878. Colorado (Morrison). Tab. 1.
fulvohirta CRESSON, 1878. Georgia (Morrison). Tab. 1.
fuscipes ROBERTSON, 1900. Illinois (Robertson). Tab. 4.
Probably same as *illinoensis;* described as a variety of *T. atriventris*. The name is preoccupied (*T. fuscipes* Morawitz, 1894).
fuscotincta COCKERELL, 1905. Oak Creek Cañon, Arizona (F. H. Snow).
gillettei COCKERELL, 1905. Fort Collins, Colorado, June 12.
Male of *T. speciosa*.
gillettei snoviana COCKERELL, 1905. Clark County, Kansas (F. H. Snow). Tab. 1, 2.
hirsutior COCKERELL, 1905. Banning, California (Davidson). Tab. 1.
Clypeus of male black with light hair.
* **honesta** CRESSON, 1872. Texas (Belfrage; Boll). Tab. 1.
Same as *belfragei*, according to Robertson.
idiotes COCKERELL, 1905. Rock Creek, California (Davidson). Tab. 1 (p. 91).
Probably a race of *T. stretchii*.
illinoensis ROBERTSON, 1902. Illinois (Robertson). Tab. 4.
intrudens CRESSON, 1879. Nevada. Tab. 1.
lata PROVANCHER, 1888. Vancouver Island (Taylor).
latior COCKERELL, 1897. Olympia, Washington (Kincaid).
Same as *lata*.
lepida CRESSON, 1878. "Texas (Belfrage); Colorado (Morrison)". Tab. 1, 2.
lippiæ COCKERELL=*Xenoglossodes lippiæ*.
* **lycii** COCKERELL, 1897. Mesilla Valley, New Mexico (Cockerell). Tab. 2.
Type.—Cat. No. 5833, U.S.N.M.
medicata COCKERELL, 1911. (Canadian Entomologist, p. 34.) Medicine Hat, Alberta (T. N. Willing).
Resembles *T. atriventis* (female), but pygidial plate narrower; hair of head (except occiput), of pleura and under part of thorax, all black; of thorax above, creamy white.
nevadensis CRESSON, 1879. Nevada (Morrison.)
Same as *intrudens*.
nigricornis PROVANCHER, 1888. Vancouver Island (Taylor).
phaceliæ COCKERELL, 1911. Albuquerque, New Mexico (J. R. Watson).
Related to *T. annæ*.
rosæ, ROBERTSON, 1900. Illinois (Robertson). Tab. 4.
* **speciosa** CRESSON, 1878. Colorado (Ridings, Morrison). Tab. 1, 2, 3.
stretchii CRESSON, 1878. California (R. H. Stretch). Tab. 1 (p. 91).
territella COCKERELL, 1905. Palisade, Colorado, May 7 (Gillette). Tab. 1, 2.
Described from the male.
trinidadensis FRIESE, 1908. Belmont, Trinidad, West Indies.
Male like *nigroænea* Smith, but face black, etc. Length, 9 mm.
truttæ COCKERELL, 1905. Trout Spring, New Mexico (Cockerell). Tab. 2.
virgata COCKERELL, 1905. Los Angeles, California (Davidson).
Described as a subspecies of *belfragei*.
yakimensis COCKERELL, 1906. Yakima, Washington.

Genus CEMOLOBUS Robertson.

Type.—(*Xenoglossa*) *Cemolobus ipomoeæ* (Robertson).
Female with clypeus trilobed; inner tooth of claws short; clypeus in male also trilobed, with a transverse apical whitish band; hind basitarsus of male arcuate, its upper apical border beveled, produced below. For other characters see Robertson, Trans. Amer. Ent. Soc., vol. 31, pp. 365 and 366.

ipomoeæ ROBERTSON, 1891. Carlinville, Illinois (Robertson).
Visits *Ipomoea*. Also in Pennsylvania.

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Genus XENOGLOSSA Smith.

Type.—Xenoglossa fulva Smith.

Maxillary palpi five jointed, longer and more slender than in *Xenoglossodes*, the last joint well developed. The mandibles are bidentate at apex in the male of *X. fulva* Smith, the type of the genus, as determined from an examination of one of F. Smith's specimens. In the similar *X. patricia* they are simple at apex in the male. They are also simple at apex in male *X. mustelina*.

SUBGENUS.

Peponapis ROBERTSON.

Type—(Xenoglossa) Peponapis pruinosa (Say). Mandibles bidentate at apex in female. Male with first joint of flagellum short.

TABLES.

(1) Cockerell. Trans. Amer. Ent. Soc., vol. 32, 1906, pp. 74–90.

(2) Cockerell. Canadian Entomologist, vol. 28, 1896, pp. 192–193.

angelica COCKERELL, 1902. Los Angeles, California (Cockerell).

apiculata CRESSON, 1878. Costa Rica (Gabb). Tab. 1 (p. 82).

assimilis SMITH, 1879. Oaxaca, Mexico.

Described as a *Melissodes*, but an examination of specimens taken by Mrs. Cockerell at Quirigua, Guatemala, shows that it is a *Xenoglossa* of the subgenus *Peponapis*. Third antennal joint of male very short.

* **brevicornis** CRESSON, 1872. Texas (Belfrage).

crawfordi COCKERELL, 1910. Guadalajara, Mexico (D. L. Crawford).

cressonii DALLA TORRE, 1896.

Same as *brevicornis*.

* **cucurbitarum** COCKERELL, 1896. Mesilla, New Mexico (Cockerell). Tab. 2.

Same as *strenua*.

Paratype.—Cat. No. 3364, U.S.N.M.

davidsoni COCKERELL, 1905. Los Angeles, California (Davidson).

Allied to *X. angelica*.

exquisita CRESSON, 1878. Mexico (Sumichrast). Tab. 1 (p. 89).

Triepeolus digueti Cockerell is parasitic on this species.

* **fulva** SMITH, 1854. Puebla, Mexico. Tab. 2.

Type of the genus.—Third antennal joint of male of the long type, but considerably shorter and less slender than in *X. patricia*.

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 328.

fulviventris SMITH, 1854. "Mexico?"

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 326.

gabbii CRESSON, 1878. Costa Rica (Gabb). Tab. 1 (p. 81).

holopyrrha DOURS (Sichel MS.), 1869. Mexico.

Same as *fulva*.

mustelina FOX, 1893. San Jose del Cabo, Lower California (Eisen).

In Proc. California Acad. Sci., 1894, p. 118, Fox treated this as a synonym of *X. fulva*. I have cotypes of both species, and find *mustelina* considerably less robust, and with paler wings, than *fulva*.

* **patricia** COCKERELL, 1896. Mesilla, New Mexico (Cockerell). Tab. 2.

Visits *Cucurbita*.

Paratype.—Cat. No. 3363, U.S.N.M.

patricia angustior COCKERELL, 1900. Buckeye, Arizona (Cockerell).

Common at Los Angeles, California.

* **pruinosa** SAY, 1836. Tab. 2.

Characters: Trans. Amer. Ent. Soc., vol. 31, pp. 365, 366. Falls Church, Virginia (N. Banks), west to Colorado.

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pruinosa limitaris COCKERELL, 1906. Brownsville, Texas (Snow).

Male; clypeus without any yellow spot; hair of head cinereous, with black hairs sparsely intermixed on face and vertex; hair of thorax above pale, with only a slight fulvous tint; legs red, more or less clouded with blackish; abdomen very black and shiny, with the usual bands much reduced.

* **strenua** CRESSON, 1878. "Georgia, Texas, New Mexico."

Characters: Trans. Amer. Ent. Soc., vol. 31, pp. 365, 366.

strenua kansensis COCKERELL, 1905. Clark Co., Kansas (Snow).

Male rather larger; legs dark reddish-fuscous; tomentum of apical abdominal segments pale cinereous or whitish.

utahensis COCKERELL, 1905. Utah. Tab. 1 (p. 90).

Female about 14 mm.; rather dark reddish-brown or ferruginous, legs bright ferruginous; maxillary palpi six-jointed, the last two joints very minute.

The South American genus *Svastra* Holmberg has five-jointed maxillary palpi, and resembles *Peponapis* in having the third antennal joint of the male short. The inner tooth of the hind claws is shorter than the outer, very much shorter in the female, an approach toward the condition found in *Cemolobus*. The mandibles are not bidentate at apex in either sex. *Svastra bombylans* Holmberg superficially resembles *Martinella luteicornis*.

Genus XENOGLOSSODES Ashmead.

Type.—(*Xenoglossa*) *Xenoglossodes albata* (Cresson).

Maxillary palpi five-jointed, the fifth joint sometimes very small.

This is almost identical with the Old World genus *Tetraloniella* Ashmead; see Cockerell, Ann. Mag. Nat. Hist., July, 1911, p. 185.

TABLES.

(1) Cockerell and Porter; Ann. Mag. Nat. Hist., December, 1899, p. 407.

(2) Cockerell; Ann. Mag. Nat. Hist., October, 1903, p. 449 (mouth-parts).

(3) Cockerell and Robbins; Univ. of Colorado Studies, vol. 7, 1910, pp. 194–195.

* **albata** CRESSON, 1872. Texas (Belfrage). Tab. 1, 2.

"Very distinct by the white pubescence, that on abdomen having a satiny or silky luster" (Cresson).

* **eriocarpi** COCKERELL, 1898. Fillmore Cañon, Organ Mountains, New Mexico (Townsend). Tab. 1, 2.

Female, 9 mm.

Type.—Cat. No. 4343, U.S.N.M.

* **excurrens** COCKERELL, 1903. Roswell, New Mexico (Cockerell). Tab. 2, 3.

gutierreziæ COCKERELL, 1905. Fillmore Cañon, Organ Mountains, New Mexico (C. H. T. Townsend). Tab. 3.

* **imitatrix** COCKERELL and PORTER, 1899. Las Vegas, New Mexico (A. Garlick). Tab. 1, 2, 3.

Visits *Sphæralcea*.

lippiæ COCKERELL, 1904. La Cueva, Organ Mountains, New Mexico (C. H. T. Townsend). Tab. 3.

Described as a variety of *Tetralonia crenulaticornis*.

lippiæ semilippiæ COCKERELL, 1905. Oak Creek Cañon, Arizona (Snow).

* **neotomæ** COCKERELL, 1906. Raton, New Mexico (T. and W. Cockerell). Tab. 3.

Allied to *X. lippiæ*.

Genus FLORILEGUS Robertson.

Type.—(*Melissodes*) *Florilegus condigna* (Cresson).

For the characters of this genus, see Robertson, Trans. Amer. Ent. Soc., vol. 31, 1905, pp. 365–366. The maxillary palpi are five-jointed.

* **condigna** CRESSON, 1878. "Illinois, Kansas."

lanierii GUÉRIN, 1845. Cuba.

palustris ROBERTSON, 1892. Illinois (Robertson).

Same as *condigna*.

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Genus ANTHEDON Robertson.

Type.—(*Melissodes*) *Anthedon compta* (Cresson).

"Scopa of female simple"; male antennæ black, not surpassing thorax. For other characters see Robertson, Trans. Amer. Ent. Soc., vol. 31, pp. 365 and 366. The female tibial scopa is in reality very briefly plumose, as may be seen under the compound microscope.

* **compta** CRESSON, 1878. Georgia (Morrison).

Genus MARTINELLA Cockerell.

Type.—(*Melissodes*) *Martinella luteicornis* (Cockerell.)

Maxillary palpi four-jointed, last joint long and cylindrical, not very much shorter than third; apex with two bristles. Malar space practically absent.

* **luteicornis** COCKERELL, 1896. Rincon, New Mexico (Cockerell).

Visits *Prosopis glandulosa*. Male antennæ yellow.

Paratype.—Cat. No. 3362, U.S.N.M.

Genus MELISSODES Smith.[1]

Type.—(*Macrocera*) *Melissodes rustica* (Say), designated by Patton.

Maxillary palpi four-jointed, last joint much shorter than third. Sometimes there are only three joints. (See Robertson, Can. Ent., Aug., 1901, p. 231.)

Melissina Cockerell is an analogous genus, with four-jointed maxillary palpi, found in India. (See Ann. Mag. Nat. Hist., Nov., 1911, p. 670.) The malar space in this genus is practically obsolete.

Epimelissodes Ashmead is a subgeneric name for *Melissodes atripes* (the type of the subgenus) and allied species.

The males have the seventh abdominal segment without lateral spines.

TABLES.

(1) Cockerell. Trans. Amer. Ent. Soc., vol. 32, 1906, pp. 74–90. (I include references to species discussed in connection with the tables.)

(2) Cockerell. Trans. Amer. Ent. Soc., vol. 32, 1906, p. 113 (females).

(3) Cockerell. Ann. Mag. Nat. Hist., June, 1905, pp. 521–522 (females).

(4) Robertson. Trans. Amer. Ent. Soc., vol. 31, 1905, pp. 367–371 (Illinois species).

* **agilis** CRESSON, 1878. Texas (Belfrage). Tab. 1, 4.

Variation; Bull. S. California Acad. Sci., Feb., 1905, p. 28.

* **agilis aurigenia** CRESSON, 1878. "Can., Me., N. Y., Va., La., Mo., Kans., Colo., N. M., Utah." Tab. 1.

agilis semiagilis COCKERELL, 1906. Fedor, Texas (Birkmann).

Male labrum black, and mandibles without yellow spot; nervures darker and redder; mesothorax more shiny.

agilis subagilis COCKERELL, 1905. Fort Collins, Colorado. Tab. 1.

Male labrum all black; no yellow spot on mandibles.

ambigua SMITH, 1879. Mexico.

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 329.

americana LEPELETIER, 1841. Carolina.

apicata LOVELL and COCKERELL, 1906. Waldoboro, Maine (Lovell).

assimilis SMITH, 1879. Oaxaca, Mexico.

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 329.

Same as *Xenoglossa assimilis* (Smith).

atrata SMITH, 1879. Oaxaca, Mexico. Tab. 1.

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 329. Not a true *Melissodes;* maxillary palpi five-jointed; male clypeus black, with a large yellow patch.

[1] *Melissodes* is usually credited to Latreille, but it was defined, and species assigned to it, by F. Smith in 1854. Lepeletier described what was understood to be Latreille's insect as *Melissoda latreillii;* this is *Acanthopus goryi* Romand. Mr. J. C. Crawford writes in a letter that Romand in 1841 included a species in *Melissodes;* I have not had access to this work.

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atratula DALLA TORRE, 1896.
Same as *atrata*.
atrifera COCKERELL, 1910. Mexico (Deppe).
atrifera sandiarum COCKERELL, 1910. Sandia Mountains, New Mexico (J. R. Watson).
atrifrons SMITH, 1854. North Carolina. Tab. 1.
Name preoccupied: = *carolinensis*.
* **atripes** CRESSON, 1872. Texas (Belfrage). Tab. 1.
atripes acomanche COCKERELL, 1905. Fedor, Texas (Birkmann).
autumnalis ROBERTSON, 1905. Near Carlinville, Illinois (Robertson). Tab. 4.
baileyi COCKERELL, 1906. Fedor, Texas, April 5 (Birkmann).
* **bimaculata** LEPELETIER, 1825. Pennsylvania. Tab. 1, 4.
Varieties *a*, *b*, *c*, Cockerell, Canadian Entomologist, July, 1905, p. 267. The species goes west to Kansas.
binotata SAY, 1837. Indiana.
Same as *bimaculata*.
blakei COCKERELL, 1905. Beulah, New Mexico (Cockerell). Tab. 1, 3.
* **boltonise** ROBERTSON, 1905. Near Carlinville, Illinois (Robertson). Tab. 4.
Falls Church, Virginia, August and September (N. Banks). Very like *M. perplexa*, but smaller; differs from *M. illata* by the smaller average size, band on middle of second abdominal segment entire or almost, and tuft on end of hind femora pale.
bruesi COCKERELL, 1906. Fedor, Texas, May 5 (Birkmann). Tab. 2.
Allied to *petalostemonis*.
cajennensis LEPELETIER, 1841. Cayenne.
Also in the West Indies.
californica SMITH, 1879. California.
Name preoccupied:=*smithii*.
* **caliginosa** CRESSON, 1878. Georgia (Morrison, Ridings). Tab. 1.
carolinensis DALLA, TORRE, 1896. Tab. 1.
New name for *Tetralonia atrifrons* Smith, from North Carolina.
chrysothamni COCKERELL, 1905. Embudo, New Mexico (Cockerell). Tab. 1, 3.
Visits *Chrysothamnus*.
civica COCKERELL, 1910. Mexico (Forrer).
* **cnici** ROBERTSON, 1901. Illinois. Tab. 1, 4.
colliciata COCKERELL, 1910. Mexico (Deppe).
* **coloradensis** CRESSON, 1878. Colorado (Ridings, Morrison). Tab. 1, 4.
Ranges to Illinois (Robertson).
* **comanche** CRESSON, 1872. Texas (Belfrage, Boll). Tab. 1.
Female resembles *M. obliqua*.
* **communis** CRESSON, 1878. "Georgia, Illinois." Tab. 1, 2.
comptoides ROBERTSON, 1897. Illinois (Robertson). Tab. 1, 4.
* **confusa** CRESSON, 1878. Colorado (Ridings, Morrison). Tab. 1.
Also in the mountains of New Mexico.
* **confusiformis** COCKERELL, 1906. Fedor, Texas (Birkmann).
Resembles *M. gilensis*. Also occurs in Colorado; see Univ. of Colo. Studies, vol. 4, 1907, p. 255.
coreopsis ROBERTSON, 1905. Near Carlinville, Illinois (Robertson). Tab. 4.
dagosa COCKERELL, 1909. Grand Coulee, Washington, July 8.
Resembles *M. lupina* and *agilis*, but male antennæ much shorter.
denticulata SMITH, 1854. "United States."
* **dentiventris** SMITH, 1854. Georgia. Tab. 1.
* **desponsa** SMITH, 1854. Ohio. Tab. 1.
desponsiformis COCKERELL, 1905. Corvallis, Oregon. Tab. 1, p. 89.

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dubitata Cresson, 1878. Georgia (Ridings, Morrison).
A valid species. See Cockerell, Canadian Entomologist, 1911, p. 34.

duplocincta Cockerell, 1905. Bill Williams' Fork, Arizona (Snow). Tab. 1.

epicharina Cockerell, 1905. Oak Creek Cañon, Arizona (Snow).
Female peculiar for the one-banded abdomen, giving it a curious resemblance to *Epicharis maculata*. A variety has two bands.

* **festonata** Provancher, 1888. Cap Rouge, Canada (Provancher).
Differs from *M. nigripes* by its smaller size and less elongated abdomen, and from *M. desponsa* by the whitish abdominal bands. Male: clypeus yellow, antennæ testaceous beneath, last two segments of abdomen with lateral teeth. Female: hair pale yellow, mixed with black on vertex and mesothorax, tegulæ black, hair of legs reddish brown.

* **fimbriata** Cresson, 1878. Texas (Belfrage). Tab. 1.

* **floris** Cockerell, 1896. San Rafael, Veracruz, Mexico (C. H. T. Townsend).
Allied to *M. agilis*. Male has some black hairs on dorsum of thorax.
Type.—Cat. No. 3354, U.S.N.M.

fremontii Cockerell, 1907. Florissant, Colorado (Rohwer).
Allied to *M. confusa*. Visits *Geranium fremontii*.

galvestonensis Cockerell, 1905. Galveston, Texas, May (F. H. Snow). Tab. 1.

georgica Cresson, 1878. Georgia (Morrison). Tab. 1.

* **gilensis** Cockerell, 1896. Gila River, New Mexico (C. H. T. Townsend). Tab. 1.
variety of the female, with much less black hair on vertex than type, was taken by Eldred Jenne at North Yakima, Washington, July 24, 1903.
Cotype.—Cat. No. 3358, U.S.N.M.

* **glenwoodensis** Cockerell, 1905. Glenwood Springs, Colorado (Gillette). Tab. 1, 2, 3.
Paratype.—Cat. No. 15069, U.S.N.M.

grandissima Cockerell, 1905. Fedor, Texas (Birkmann). Tab. 1.
Resembles *M. comanche;* female nearly 19 mm. long. Male: Ann. Mag. Nat. Hist., April, 1906, p. 361.

* **grindeliæ** Cockerell, 1898. Santa Fe, New Mexico (Cockerell). Tab. 1.
Paratype.—Cat. No. 4077, U.S.N.M.

helenæ Cockerell, 1906. Las Cruces, New Mexico, August 19 (Townsend).
Allied to *M. humilior*.

helianthelli Cockerell, 1905. Mesilla, New Mexico (Cockerell). Tab. 1, 3.
Female almost 18 mm. Visits *Helianthus ciliaris*.

herricki Cockerell, 1905. New Mexico (F. H. Snow). Tab. 1.

hewetti Cockerell, 1905. Santa Fe, New Mexico (Cockerell). Tab. 1, 3.

hexacantha Cockerell, 1905. Arizona (F. H. Snow). Tab. 1.

hirsuta Smith, 1879. Oaxaca, Mexico.
Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 328. Allied to *M. aurigenia*.

hitei Cockerell, 1908. Pueblo, Colorado, August 17 (G. M. Hite).
Resembles *M. martini*.

hortivagans Cockerell, 1905. Garden City, Kansas (H. W. Menke). Tab. 1.
Gynandromorph; Ann. Mag. Nat. Hist., April, 1906, p. 360.

humilior Cockerell, 1903. Organ, New Mexico (Cockerell). Tab. 1.

humilior catalinensis Cockerell, 1905. Catalina Island, California (Davidson).
Described as a variety of *M. intermediella*.

* **hymenoxidis** Cockerell, 1906. Florissant, Colorado (Cockerell).
Related to *M. perplexa*. Hair of pleura black in female. Visits *Hymenoxys*.
Paratype.—Cat. No. 150571, U.S.N.M.

illata Lovell and Cockerell, 1906. Waldoboro, Maine (Lovell).
Visits *Solidago*.

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illinoensis ROBERTSON, 1895. Illinois (Robertson). Tab. 4.

intermedia CRESSON, 1872. Texas (Belfrage). Tab. 1, p. 90.

intermediella COCKERELL, 1905. Mesilla Valley, New Mexico (Cockerell). Tab. 1.

intorta CRESSON, 1872. Texas (Belfrage). Tab. 1.

Male with black clypens; antennæ not half as long as in *tristis*.

kallstroemiæ COCKERELL, 1905. Mesilla Park, New Mexico (Cockerell). Tab. 1.

kallstroemiæ phenacoides COCKERELL, 1905. Las Cruces, New Mexico (Cockerell). Tab. 1.

Formerly confused with *M. communis* (male), but easily separated by the total absence of black hair on thorax and entirely ferruginous tarsi.

* **labiatarum** COCKERELL, 1896. San Rafael, Vera Cruz, Mexico (Townsend).

Superficially rather like *Tetralonia atriventris*.

Type.—Cat. No. 3356, U.S.N.M.

loena COCKERELL, 1909. Lee County, Texas (Birkmann).

lupina CRESSON, 1878. California (Hy. Edwards). Tab. 1.

Extremely close to *M. agilis*. See Bull. S. California, Acad. Sci., February, 1905, p. 31. North Yakima, Washington, July 10, 1903, from Professor Melander.

* **lupina composita** TUCKER, 1909. Colorado Springs, Colorado (Tucker).

Male with eyes bluer green and diverging less above; mesothorax more shiny.

Type.—Cat. No. 12878, U.S.N.M.

* **machærantheræ** COCKERELL, 1904. Near White Sands, New Mexico (Cockerell). Tab. 1.

Also in Arizona. Male almost 15 mm. long.

manipularis SMITH, 1854. Georgia. Tab. 1.

The thoracic dorsum of male has some black hair, not mentioned by Smith.

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 329. Falls Church, Virginia (N. Banks).

martini COCKERELL, 1905. Las Valles, New Mexico (T. and W. Cockerell). Tab. 1, 3.

Visits *Petalostemon* in August.

masuca COCKERELL, 1909. Fedor, Texas (Birkmann).

Runs in Tab. 1 to vicinity of *aurigenia* and *agilis* (males).

maura CRESSON, 1865. Cuba (Gundlach). Tab. 1.

megacerata COCKERELL, 1906. Fedor, Texas, October 13 (Birkmann).

Male antennæ very long (10 mm.).

melandri COCKERELL, 1906. Fedor, Texas, October (Birkmann). Tab. 2.

melanosoma COCKERELL, 1905. Fedor, Texas (Birkmann).

In Canadian Entomologist, July, 1905, p. 266, is a table comparing this with *M. pernigra*, *atrata*, and *bimaculata*.

* **menuacha** CRESSON, 1868. New Mexico (S. Lewis). Tab. 1.

Colorado. (See Cresson).

menuacha semilupina COCKERELL, 1905. Los Angeles, California (Davidson).

Male; labrum not black at sides; red of antennæ darker; mandibles with yellow spot.

menuacha submenuacha COCKERELL, 1897. Las Cruces, New Mexico (Cockerell).

Male with mandibles black, without any yellow spot; nervures dark.

microsticta COCKERELL, 1905. Vancouver Island. Tab. 1.

* **mimica** CRESSON, 1869. Cuba. Tab. 1.

Also in Jamaica, according to Fox.

* **mixeæ** COCKERELL, 1905. Las Vegas, New Mexico, (S. L. Mize). Tab. 1, 3.

Visits *Grindelia*. A variety was found by Mr. Eldred Jenne at North Yakima, Washington, September 26, 1903.

* **montana** CRESSON, 1878. Colorado (Ridings); New Mexico (Lewis). Tab. 1.

The female described is the same as *M. grindeliæ*, but the male is another species.

morosa CRESSON, 1878. Mexico (Sumichrast). Tab. 1, p. 82.

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* **mysops** COCKERELL, 1905. Maybell, Colorado. Tab. 1, 2.
Visits thistle flowers.
Variation; Entomologist, December, 1907, p. 269. Also at North Yakima, Washington, July 27, 1903 (Eldred Jenne). A male from North Yakima, August 22, 1903 (E. Jenne) is placed as a variety of *M. mysops*, but it has the apical part of flagellum bright ferruginous beneath. It is unfortunately in bad condition; possibly it is the undescribed male of *M. desponsiformis*.

* **nevadensis** CRESSON, 1879. Nevada (Morrison). Tab. 1.

nigra LEPELETIER, 1841. Pennsylvania.
Same as *bimaculata*.

nigripes SMITH, 1854. "United States."
Smith's male is *M. cnici*.

nigroaenea SMITH, 1854. Brazil.
Bertoni and Schrottky (1910) state that they received it from Texas, labelled *M. menuacha*. A female *nigroaenea* received from Schrottky has the facial quadrangle broader and shorter than in *menuacha*. It is from San Juan, Argentina.

* **nigrosignata** COCKERELL, 1905. Oak Creek Cañon, Arizona (Snow). Tab. 1.

nigrosignata pallidisignata COCKERELL, 1905. Oak Creek Cañon, Arizona (Snow). Tab. 1.

nivea ROBERTSON, 1895. Illinois (Robertson). Tab. 4.
Falls Church, Virginia, September (N. Banks).

oajacana DALLA TORRE, 1896.
Same as *hirsuta*.

* **obliqua** SAY, 1837. Indiana. Tab. 1, 4.

* **opuntiella** COCKERELL, 1911. Brownsville, Texas (Jones and Pratt).
Type.—Cat. No. 14105, U.S.N.M.

otomita CRESSON, 1878. Mexico (Sumichrast). Tab. 1.

pallida ROBERTSON, 1895. Illinois (Robertson). Tab. 4.

* **pallidicincta** COCKERELL, 1896. Gila River, New Mexico (C. H. T. Townsend). Tab. 1.
Paratype.—Cat. No. 3357, U.S.N.M.

parosela COCKERELL, 1905. Mesilla, New Mexico (Cockerell). Tab. 1.
Visits *Parosela scoparia*.

pecosella COCKERELL, 1905. Pecos, New Mexico (W. P. Cockerell). Tab. 1.

pecosella verbesinarum COCKERELL, 1905. Las Cruces, New Mexico (Cockerell). Tab. 1.
Identical with *Xenoglossodes excurrens*.

* **pennsylvanica** LEPELETIER, 1841. Pennsylvania. Tab. 1.

pernigra COCKERELL, 1896. San Rafael, Vera Cruz, Mexico (C. H. T. Townsend).
Resembles *M. atrata* and *bimaculata*. Visits *Ipomoea*. Male clypeus dark.

* **perplexa** CRESSON, 1878. "Georgia (Morrison); Texas (Belfrage)." Tab. 1, 2.
Falls Church and Glencarlyn, Virginia, July to September (N. Banks).

* **personatella** COCKERELL, 1901. La Jolla, California (Cockerell). Tab. 1.
Type.—Cat. No. 13189, U.S.N.M.

petalostemonis ROBERTSON, 1900. Illinois (Robertson). Tab. 4.
Near *M. communis*.

petulca CRESSON, 1878. Georgia (Morrison). Tab. 1.

petulca suffusa CRESSON, 1878. Texas (Belfrage, Heiligbrodt).
The Rev. G. Birkmann writes that he believes *suffusa* to be a valid species, distinct from *petulca*, but that males which have been ascribed to *suffusa* really belong to *petulca*. He takes *suffusa* during the first half of May, *petulca* from about the middle of May to the middle of June.

petulciformis COCKERELL, 1906. Fedor, Texas (Birkmann).
Closely resembles *M. petulca*.

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pimella COCKERELL, 1906. Arizona.
A small species resembling *agilis*.
pinguis CRESSON, 1878. Mexico (Sumichrast). Tab. 1.
New description.—Trans. Amer. Ent. Soc., vol. 24, p. 157.
pinguis velutinella COCKERELL, 1897. San Rafael, Mexico (C. H. T. Townsend).
The abdominal pile yellowish white.
præcauta COCKERELL, 1905. Oak Creek Canon, Arizona (Snow). Tab. 1.
pullata CRESSON, 1865. Cuba. Tab. 1.
pygmæa CRESSON, 1872. Texas (Belfrage). Tab. 1, p. 91.
* **raphaelis** COCKERELL, 1896. San Rafael, Mexico (Townsend). Tab. 1, 2.
Quirigua, Guatemala (W. P. Cockerell).
Type.—Cat. No. 3355, U.S.N.M.
rivalis CRESSON, 1872. Texas (Belfrage, Boll). Tab. 1.
* **rufodentata** SMITH, 1854. St. Vincent, Grenada.
* **ruidosensis** COCKERELL, 1896. Ruidoso Creek, New Mexico.
Same as *confusa*.
Cotype.—Cat. No. 3361, U.S.N.M.
* **rustica** SAY, 1837. Indiana.
saponellus COCKERELL, 1908. Soap Lake, Grand Coulee, Washington.
Female; looks like *Xenoglossodes imitatrix*.
semitristis COCKERELL, 1905. Oak Creek Cañon, Arizona (Snow). Tab. 1.
senilis SMITH, 1854. Mount Pleasant, Ohio.
Same as *denticulata*. Provancher records it from Ottawa, Canada.
simillima ROBERTSON, 1897. Illinois (Robertson). Tab. 2, 4.
Comparison with *perplexa;* Psyche, October, 1906, p. 111.
smithii DALLA TORRE, 1896.
Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 328.
* **snowii** CRESSON, 1878. Colorado (F. H. Snow). Tab. 1.
Pubescence white.
Comparison with *M. agilis* and *aurigenia;* Tucker, Trans. Kansas Acad. Sci., 1909, pp. 278–281.
* **sphæralcese** COCKERELL, 1896. Santa Fe, New Mexico (Cockerell). Tab. 1.
Male clypeus black.
Paratype.—Cat. No. 3360, U.S.N.M.
spissa CRESSON, 1872. Texas (Belfrage). Tab. 1.
* **stearnsi** COCKERELL, 1905. Los Angeles, California (Davidson). Tab. 1.
Paratype.—Cat. No. 15070, U.S.N.M.
suavis CRESSON, 1878. Colorado (Morrison). Tab. 1, p. 91.
"A very pretty little species, the abdomen (female) appearing white with four narrow shining black bands." (Cresson.) Flagellum rufo-testaceous beneath.
* **suffusa** CRESSON, 1878. Texas (Belfrage, Heiligbrodt). Tab. 1.
See *M. petulca suffusa*.
tenuitarsis COCKERELL, 1905. Arizona (F. H. Snow). Tab. 1.
tepaneca CRESSON, 1878. Mexico (Sumichrast). Tab. 1.
tepaneca aschenborniana COCKERELL, 1912. Guatemala (W. P. Cockerell).
tepida CRESSON, 1878. Nevada (Hy. Edwards). Tab. 1, p. 85.
texana CRESSON, 1872. Texas (Belfrage, Boll). Tab. 1.
texana flaveriæ COCKERELL, 1906. Roswell, New Mexico (Cockerell).
Visits *Flaveria*.
* **thelypodii** COCKERELL, 1905. La Cueva, Organ Mountains, New Mexico (Townsend). Tab. 1, 3.
townsendi COCKERELL, 1896. Las Cruces, New Mexico (Townsend). Tab. 1.
Male large and robust, the abdomen covered with fulvous hair.
* **trifasciata** CRESSON, 1878. Porto Rico (Krug). Tab. 1.
"This may prove to be the female of *mimica*." (Cresson.) Jamaica.

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* **trifasciatella** ASHMEAD, 1900. Kingstown, St. Vincent, West Indies (H. M. Smith). Female 8 to 9 mm.

Type.—Cat. No. 6396, U.S.N.M.

trinodis ROBERTSON, 1901. Illinois (Robertson). Tab. 4.

Maxillary palpi often three-jointed.

* **tristis** COCKERELL, 1904. Mesilla Valley, New Mexico (Cockerell). Tab. 1.

Paratype.—Cat. No. 3359, U.S.N.M.

tristis malvina COCKERELL, 1902. Cerro Chilicote, State of Chihuahua, Mexico (Townsend.)

Male smaller than *tristis*, eyes dark brown, flagellum dark reddish beneath, nervures mostly piceous. Probably a distinct species. Visits Malvaceæ.

* **tuckeri** COCKERELL, 1909. Plano, Texas, October (E. S. Tucker).

Resembles *perplexa* (female), but mesothorax shining, and closely beset with very deep and large punctures.

variabilis ROBERTSON, 1905. Near Carlinville, Illinois (Robertson). Tab. 4.

vernonensis VIERECK, 1905. Vernon, British Columbia (Harvey). Tab. 1.

Described as a subspecies of *M. menuacha*.

* **vernoniæ** ROBERTSON, 1902. Illinois (Robertson). Tab. 4.

vernoniana ROBERTSON, 1905. Near Carlinville, Illinois (Robertson). Tab. 4.

wheeleri COCKERELL, 1906. Fedor, Texas, May 23 (Birkmann). Tab. 2.

Supposed male; Ann. Mag. Nat. Hist., April, 1906, p. 367.

wickhami COCKERELL, 1906. Fedor, Texas, May 3 (Birkmann). Tab. 2.

xanthopteralis COCKERELL, 1906. Fedor, Texas, May 26 (Birkmann).

Wings very yellow.

Genus THYGATER Holmberg.

Type.—(*Tetralonia*) *Thygater terminata* (Smith).

Maxillary palpi three jointed. Malar space large.

Macroglossapis Cockerell, type (*Macroglossa*) *Macroglossapis oribazi* Radoskowski, is the same genus. This genus, on account of the large malar space and other characters can not well have been derived from the *Melissodes* group.

Thygatina Cockerell is an analogous genus, with three-jointed maxillary palpi, found in Ceylon. (See Trans. Amer. Ent. Soc., vol. 37, p. 237.)

TABLES.

(1) Cockerell. Trans. Amer. Ent. Soc., vol. 32, 1906, p. 74, 83.

* **albilabris** CRESSON, 1878. Mexico (Sumichrast). Tab. 1.

analis LEPELETIER, 1841. Brazil. Tab. 1.

According to Friese the Mexican *oribasi* is the same.

* **cockerelli** CRAWFORD, 1906. San Jose, Costa Rica (Crawford).

Described from the female. Quirigua, Guatemala (W. P. Cockerell).

Type.—Cat. No. 10076, U.S.N.M.

modesta SMITH, 1879. Oaxaca, Mexico. Tab. 1.

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 327.

montezuma CRESSON, 1878. Mexico (Sumichrast). Tab. 1.

* **nigravillosa** CRAWFORD, 1906. San Jose, Costa Rica (Crawford).

Described from the male. Quirigua, Guatemala (W. P. Cockerell).

Type.—Cat. No. 10077, U.S.N.M.

oribasi RADOSZKOWSKI, 1884. Mexico.

Same as *analis*, according to Friese. Female 16 mm.

* **rubricata** SMITH, 1879. Oaxaca, Mexico. Tab. 1.

Notes on type.—Trans. Amer. Ent. Soc., vol. 31, p. 328.

Costa Rica form; Trans. Amer. Ent. Soc., vol. 32, p. 159. Specimens in U. S National Museum are Costa Rican form.

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BRYOZOA FROM LABRADOR, NEWFOUNDLAND, AND NOVA SCOTIA, COLLECTED BY DR. OWEN BRYANT.

By RAYMOND C. OSBURN,
Assistant Professor of Zoology, Columbia University.

During the summer of 1908 Dr. Owen Bryant made a collection of marine animals off the northeastern coast of North America. Bryozoa were obtained at eighteen of the dredging stations, which extended from Cape Mugford, Labrador, about latitude 58°, to Cape Sable, Nova Scotia, in latitude about 43°. In depth the dredgings range from 5 to 110 fathoms. While the material in this group brought back by Doctor Bryant was small in amount it was fairly rich in species, as indicated by the list of 24 genera and 51 species.

To avoid constant repetition in the catalogue the depth and character of bottom of the dredging stations is given in the following table:

Position of station.	Depth.	Character of bottom.
	Fathoms.	
Egg Harbor, Labrador	7	Mud.
Near Egg Harbor, Labrador	20	Do.
Outside of Hebron, Labrador	60	Gravel.
Do	80	Do.
Halfway from Mugford to Hebron, Labrador	60	Mud and sand.
Off Beachy Island, between Flint Island and Cape Mugford, Labrador	80	Do.
Shoal Tickle, 20 miles southeast of Nain, Labrador	25	Gravel.
20 miles northeast of Nain, Labrador		
St. Pierre, Newfoundland	5	Do.
St. Pierre Bank, Newfoundland	30	Pebbles.
St. Lawrence Harbor, Placentia Bay, Newfoundland	50	
Southeast of Burin, Placentia Bay, Newfoundland	110	
Off Cape Race, Newfoundland		
West-northwest 75 miles of Sable Island, Nova Scotia	75	Fine sand.
20 miles east of Cape Sable, Nova Scotia	70	Do.
Browns Bank, off Cape Sable, Nova Scotia	40	Rocks and sand.
14 miles south of Cape Sable, Nova Scotia	45	Rocks.
40 miles west by south from Cape Sable, Nova Scotia	75	Gravel.
43 miles west by south from Cape Sable, Nova Scotia	110	Do.

The nomenclature of the Bryozoa has undergone so much revision since the earlier work of Dawson, Stimpson, Packard, and Verrill that many of the specific names cited by these writers are now scarcely recognizable except to the specialist in this group. I have therefore included in the synonymy all the names that have been applied by writers on North American Bryozoa to the species mentioned in this list, whenever such names differ from the present usage.

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Suborder CYCLOSTOMATA.

CRISIA CRIBRARIA Stimpson.

Crisia cribraria STIMPSON, 1853, p. 18.
Crisia eburnea var. *cribraria* VERRILL, 1879*b*, p. 28.—WHITEAVES, 1901, p. 110.

Locality.—Fourteen miles south of Cape Sable, several well-developed colonies with ovicells.

The validity of this species has been in doubt ever since Stimpson described it, and several authors have, apparently without studying the material, placed it under various others as a synonym. There can be no doubt, however, that it is a good species. The writer has redescribed and figured it in a recent paper.[1]

? CRISIA DENTICULATA (Lamarck).

Crisia eburnea var. *denticulata* VERRILL, 1879*b*, p. 28.

Along with the preceding species were some specimens that appear to belong to *denticulata*, but as no ovicells are present the identification can not be made with certainty.

CRISIA EBURNEA (Linnæus).

Localities.—Along with the two preceding and also at Browns Bank. Only a few small specimens were taken, but ovicells were present in both cases.

LICHENOPORA VERRUCARIA (Fabricius).

Madrepora verrucaria FABRICIUS, 1780, p. 430.
Diastopora patina VERRILL and SMITH, 1873, p. 707.
Discoporella verrucaria VERRILL, 1875*a*, p. 414; 1875*b*, p. 41; 1879*b*, p. 28.—RINK, 1877, p. 443.

Locality.—Fourteen miles south of Cape Sable, two colonies on hydroid stems.

LICHENOPORA REGULARIS (d'Orbigny).

Locality.—At Shoal Tickle, Labrador; there was found one complete colony and portions of two others. This seems to be d'Orbigny's species without doubt, though the size is larger than anywhere recorded (fully one-half inch across), the rays of zoœcial tubes are by no means regular and the zoarium is much warped. In all the Lichenoporæ the form of the zoarium is more or less adjusted to the substratum and the arrangement of the zoœcial tubes is modified accordingly. I have compared these specimens with one so named by Norman in the collection of the Geological Survey of Canada.

TUBULIPORA ATLANTICA (Johnston).

Idmonea atlantica SMITT, 1872, p. 6.—PACKARD, 1867, p. 270.—WHITEAVES, 1901, p. 111.
Idmonea pruinosa STIMPSON, 1853, p. 18.

Localities.—Browns Bank, rare; 14 miles off Cape Sable, common.

[1] Bryozoa of the Woods Hole Region, Bull. U. S. Fish Com. for 1910, p. 215, pl. 18, figs. 7, 7*a*, and 7*b*.

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TUBULIPORA FLABELLARIS (Fabricius).

Tubipora flabellaris FABRICIUS, 1780, p. 430.
Diastopora verrucaria PACKARD, 1867, p. 269.

Locality.—A single colony of this species was taken at St. Pierre Bank.

Suborder CHEILOSTOMATA.

GEMELLARIA LORICATA (Linnæus).

Loricaria americana LAMOUROUX, 1816, p. 7.
Gemellaria dumosa STIMPSON, 1853, p. 19.
Gemellaria willisii DAWSON, 1865, p. 3.

Locality.—One colony taken halfway between Mugford and Hebron, Labrador.

MENIPEA TERNATA (Solander).

Cellularia densa DESOR, 1848, p. 66.
Cellularia ternata VERRILL and SMITH, 1873, p. 711.—VERRILL, 1879*a*, p. 53, and 1879*b*, p. 28.—RINK, 1877, p. 443.

Localities.—Forty-three miles west by south from Cape Sable, rare; 14 miles south of Cape Sable, common; St. Pierre Bank, rare.

SCRUPOCELLARIA SCABRA (Van Beneden).

Cellularia scabra RINK, 1877, p. 443.
Cellarina scabra VERRILL, 1879*a*, p. 53; 1879*b*, p. 29.

Localities.—Fourteen miles south of Cape Sable, common; St. Pierre, rare; St. Pierre Banks, rare; Egg Harbor, rare.

CABERREA ELLISII (Fleming).

Localities.—Forty-three miles west by south from Cape Sable, rare; Browns Bank off Cape Sable, rare; 14 miles off Cape Sable, common.

BICELLARIA CILIATA (Linnæus).

Locality.—Browns Bank off Cape Sable, not common.

BUGULA CUCULLIFERA Osburn.

Bugula cucullata VERRILL, 1879*a*, p. 53; 1879*b*, p. 29; and 1880, p. 188, is preoccupied by *B. cucullata* BUSK, 1867, p. 241.

Locality.—Shoal Tickle, 20 miles southeast of Nain, Labrador, one small colony. This record greatly extends the known range of this species, which has hitherto been recorded as occurring from Cape Cod to Jeffrey's Ledge, Maine.

BUGULA MURRAYANA (Johnston).

Flustra truncata DESOR, 1848, p. 66.—STIMPSON, 1853, p. 19.
Flustra murrayana PACKARD, 1863, p. 406.
Menipea fruticosa PACKARD, 1867, p. 273, for the narrow-branched variety.

Localities.—Forty-three miles southwest of Cape Sable, not common; 14 miles south of Cape Sable, not common; Browns Bank, not

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common; Shoal Tickle, one colony; outside of Hebron, Labrador, not common; Egg Harbor, Labrador, not common.

The variety *fruticosa* Packard, characterized by narrow fronds, occurred along with the typical form at Shoal Tickle, Labrador, and at Browns Bank, off Cape Sable.

KINETOSKIAS ARBORESCENS (Koren and Danielssen).

Bugula umbella VERRILL, 1879*a*, p. 52, synonymy.

Localities.—Twenty miles east of Cape Sable and 75 miles west northwest from Sable Island, one colony at each station. Both colonies were symmetrically developed and bore ovicells with embryos. It is perhaps worthy of note that these stations were at considerable depth, 70 and 75 fathoms, respectively, and that the bottom sample was clean, fine sand in both cases.

FLUSTRA CARBASEA Solander.

Flustra digitata PACKARD, 1867, p. 274.
Flustra papyrea VERRILL, 1879*b*, p. 29.

Localities.—Egg Harbor, Labrador, one colony; near Egg Harbor, not common; Shoal Tickle, Labrador, one colony.

FLUSTRA SECURIFRONS (Pallas).

Carbasea papyrea DAWSON, 1859, p. 257.
Flustra truncata PACKARD, 1867, p. 274.

Locality.—St. Pierre Banks, one well-developed colony. Whiteaves (1901) does not list this species because of doubt as to the records of Packard, saying that "Verrill states that Stimpson's *F. truncata* is *Bugula murrayana*, and it may be that Packard's is also." Packard was well acquainted with *Bugula murrayana*, however, as early as 1863 when he listed it under the name of *Flustra murrayana* for the region about Caribou Island, Labrador; and it is not likely that he would later mistake *F. securifrons* for it. However that may be, there can be no doubt concerning the present specimen, and the species is henceforth to be included in the list of Canadian Bryozoa.

MEMBRANIPORA CRATICULA Alder.

Membranipora lineata var. *craticula* VERRILL, 1879*b*, p. 29.

Localities.—St. Pierre Bank, Newfoundland, one colony on *Pecten* shell; near Egg Harbor, Labrador, one colony on the back of a colony of *Flustra carbasea;* Shoal Tickle, Labrador, one colony on the inside of a shell. The last-mentioned colony has the large vicarious avicularia abundantly developed. It is altogether likely that some of the earlier records of *M. lineata* (Linnæus) were based on this species which is much more common than *lineata* in American waters.

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MEMBRANIPORA CYMBÆFORMIS Hincks.

Membranipora spinifera VERRILL, 1879*b*, p. 29.

Localities.—Fourteen miles south of Cape Sable, several colonies; Shoal Tickle, Labrador, rare. This species seldom grows attached to shells or stones, but is usually found on the stems of hydroids or on other Bryozoa. The dorsal side of the fronds of *Bugula murrayana* seems to be a favorite locality. The colonies are never large, seldom over one-fourth inch across.

MEMBRANIPORA SERRULATA (Busk).

Flustra serrulata WHITEAVES, 1901, p. 95.

Localities.—Southeast of Burin, Placentia Bay, Newfoundland, rare; outside of Hebron, Labrador, rare; halfway from Mugford to Hebron, Labrador, rare; Egg Harbor, Labrador, rare; Shoal Tickle, Labrador, several colonies.

This species was placed in the genus *Flustra* by Busk because of its habit of assuming an erect form. It is never flexible, however, and it often grows attached like other Membraniporas, and both conditions are frequently exhibited by the same colony. One specimen was found encrusting the back of a *Flustra carbasea* and others on erect colonies of *Escharoides* and *Porella*, encrusting as a single layer on the stems or reaching in a bilaminate form from one branch to another.

MEMBRANIPORA TRIFOLIUM (S. Wood).

Membranipora solida PACKARD, 1867, p. 272.
Mollia flemingii var. *solida* VERRILL, 1879*b*, p. 29.

Locality.—Shoal Tickle, Labrador, two colonies on pebbles.

MEMBRANIPORA UNICORNIS (Fleming).

Locality.—Shoal Tickle, Labrador, several small colonies.

MEMBRANIPORELLA CRASSICOSTA Hincks.

Locality.—Shoal Tickle, Labrador, several small colonies.

CRIBRILINA ANNULATA (Fabricius).

Cellepora annulata FABRICIUS, 1780, p. 436.
Lepralia annulata STIMPSON, 1853, p. 18.—PACKARD, 1867, p. 270.
Escharipora annulata WHITEAVES, 1874, p. 11.—RINK, 1877, p. 443.

Locality.—Fourteen miles south of Cape Sable, one colony on shell.

MICROPORELLA CILIATA (Pallas).

Lepralia ciliata PACKARD, 1867, p. 270.
Porina ciliata RINK, 1877, p. 443.
Porellina ciliata.—SMITT, 1873, p. 26.—VERRILL, 1879*b*, p. 29
Porellina stellata VERRILL, 1879*a*, p. 53; 1879*b*, p. 29; and 1880, p. 190 (=a variety of *M. ciliata*).

Locality.—Shoal Tickle, Labrador, one young colony on pebble.

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HIPPOTHOA HYALINA (Linnæus).

Cellepora hyalina FABRICIUS, 1780, p. 435.—RINK, 1877, p. 444
Mollia hyalina VERRILL and SMITH, 1873, p. 713.
Celleporella hyalina BIDENKAP, 1905, p. 18.
Schizoporella hyalina WHITEAVES, 1901, p. 100.—CORNISH, 1907, p. 77.

Localities.—Fourteen miles south of Cape Sable, few; St. Pierre Banks, Newfoundland, several small colonies on *Pecten* shell; near Egg Harbor, Labrador, several small colonies on the back of *Flustra carbasea.*

This species has been much shifted about in various genera, especially in *Celleporella, Schizoporella,* and the above. While the character of the orifice might place it in any of these genera, I am convinced that its relations are particularly with *Hippothoa* with which it agrees in the texture of the ectocyst and in the dwarfed condition of the fertile zoœcia. The appearance of the colony is, to be sure, quite different from that of the common *Hippothoa divaricata* Lamouroux, but in this respect *Hippothoa expansa* Dawson is intermediate.

SCHIZOPORELLA AURICULATA (Hassall).

Lepralia globifera PACKARD, 1867, p. 408.
Escharella auriculata VERRILL, 1875*a*, p. 414.—RINK, 1877, p. 444.
Smittia globifera VERRILL, 1879*b*, p. 30; 1880, p. 192.—WHITEAVES, 1901, pp. 100 and 106, records the species under this name and also under *auriculata.*

Localities.—Fourteen miles south of Cape Sable, several colonies; St. Pierre Bank, Newfoundland, one colony.

SCHIZOPORELLA PLANA (Dawson).

Lepralia plana DAWSON, 1859, p. 256.
Myriozoum crustaceum RINK, 1877, p. 444.
Leiochara plana VERRILL, 1879*b*, p. 30.
Myriozoum planum HINCKS, 1892, p. 157.—WHITEAVES, 1901, p. 99.
Schizoporella crustacea BIDENKAP, 1905, p. 17.

Locality.—Shoal Tickle, Labrador, one colony encrusting stem of *Myriozoum coarctatum.*

After studying this species carefully with ample material I can see no valid reason for placing it in the genus *Myriozoum* as has been done by nearly all writers. The form of the zoœcial orifice, to be sure, is similar to that of *M. coarctatum,* but this structure varies as greatly in *Myriozoum* as it does in *Schizoporella,* and the zoœcial aperture in such species as *S. cecelii* and *S. spongites* has essentially the same character as that of *S. plana.* The formation of the colony, the character of the zoœcial wall and of the ovicell all seem to relate the species closely to *Schizoporella.* The species has generally been known under the name of *Myriozoum crustaceum* Smitt and later European authors have adhered to this is spite of the fact that Hincks (1892, p. 157) has shown that Dawson was the first to describe the species under the name *Lepralia plana.*

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MYRIOZOUM COARCTATUM (Sars).

Myriozoum subgracile PACKARD, 1867, p. 276 and elsewhere.—WHITEAVES, 1869, p. 2; 1874, p. 5; 1901, p. 99 (two species).—RINK, 1875, p. 444, both *M. coarctatum* and *M. subgracile*.

Leieschara coarctaum and *L. subgracile* VERRILL, 1879*b*, p. 30.

Localities.—Outside of Hebron, Labrador, two colonies; Shoal Tickle, Labrador, common.

CELLEPORA CANALICULATA Busk.

Localities.—Fourteen miles south of Cape Sable, few; Browns Bank off Cape Sable, several colonies.

This species encrusts the stems of other Bryozoa or of Hydroids, forming pisiform or occasionally branched colonies with a diameter usually less than one-fourth inch. Busk described the species from the *Challenger* dredgings off Halifax, Nova Scotia. Hincks has recorded it for the Gulf of St. Lawrence, and the writer has obtained it off Cape Cod, Massachusetts. It seems to be common between Cape Cod and Newfoundland, judging by the collections of the United States Bureau of Fisheries, and there is no way of determining how much it has been confused with other species by earlier writers.

CELLEPORA CONTIGUA (Smitt).

Plate 34, fig. 1.

Locality.—Fourteen miles south of Cape Sable, one colony on shell of *Pecten tenuicostata*.

The specimen is in a very advanced stage of calcification. As far as can be judged from Smitt's description (1867, p. 31, figs. 198–201) and his very small figures the determination of the species is correct. Figure 1 shows a couple of zoœcia near the edge of the colony. In the fully calcified condition the outlines of the zoœcia are completely immersed in a continuous nodular crust.

CELLEPORA SURCULARIS (Packard).

Celleporaria surcularis PACKARD, 1863, p. 410, and 1867, p. 274.—VERRILL, 1879*b*, p. 30.

Celleporaria incrassata WHITEAVES, 1874, p. 5.—RINK, 1877, p. 444.

Porella surcularis WHITEAVES, 1901, p. 104.

Cellepora incrassata of AUTHORS, not of LAMARCK.

Localities.—Fourteen miles south of Cape Sable, two fine colonies; off Cape Race, one fragment; off St. Lawrence Harbor, Placentia Bay, one fragment; St. Pierre Bank, Newfoundland, one colony attached to shell; outside of Hebron, Labrador, one colony; Shoal Tickle, Labrador, several colonies; 20 miles northeast of Nain, Labrador, one fragment.

This is the *Cellepora incrassata* of authors, but the species described under this name by Lamarck is known to have been from the Mediterranean and is not identical with the present one. Busk seems to have had this species when he discussed and figured "*Cellepora cervi-*

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cornis auctor. (pars)," [1] but he identified the specimen with Couch's *C. cervicornis*, which is *Porella compressa.*

The name *surcularis* given by Packard is therefore the oldest name of unquestioned validity and should stand as the name of the species. In naming the species Packard was aware that he was dealing with this common northern species of wide distribution for he states expressly that "European authors have confounded this arctic species with *Cellepora cervicornis* of the Mediterranean Sea."

LEPRALIA SPATHULIFERA Smitt.

Plate 34, figs. 2, 2*a*, and 2*b*.

Locality.—St. Pierre Bank, Newfoundland, three young colonies on the inside of a valve of *Pecten tenuicostata.*

This is a very striking species among the Lepralias on account of the spatulate spine situated on the midline of the front wall just behind the aperture. The species has been much misunderstood and has consequently been shifted about. Waters (1900, p. 87) placed it in the genus *Microporella* under the mistaken notion that it possessed a tubular median pore. Anderson (1902, p. 542) replaced it in *Lepralia* on the ground that "Bei den von mir untersuchten Colonien konnte ich niemals einen Porus beobachten." Norman (1903, p. 106) erected a new genus for it, characterized especially by the presence of a median pore behind the spatulate spine.

The small colonies collected by Doctor Bryant are in excellent condition for study, and there can be no doubt whatever that there is no median pore at all. Instead a small avicularium occupies the position of the supposed "pore" of Norman and Waters. The avicularium is raised upon a projection of the cell, and is minute but quite distinct. It is easy to understand how the loss of the avicularium in older stages might have caused the misconception of the relationships of the species. The spatulate frontal spine as well as the oral spines vary remarkably in size and form.

LEPRALIA HIPPOPUS Smitt.

Locality.—Shoal Tickle, Labrador, one well-developed colony on a pebble.

MUCRONELLA SPINULIFERA Hincks.

Mucronella spinulifera HINCKS, 1889, p. 431.
Monoporella spinulifera HINCKS, 1892, p. 152.—WHITEAVES, 1901, p. 108.

Locality.—Shoal Tickle, Labrador, one well-developed colony on a pebble.

Hincks, in his original description placed this species in the genus *Mucronella* but later [2] changed it over to *Monoporella.* All more recent writers have replaced it in *Mucronella.* After a careful study of the above specimen the present writer accepts this view.

[1] Ann. and Mag. Nat. Hist., ser. 2, vol. 18, p. 32.

[2] See Synonomy.

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MUCRONELLA PRÆLUCIDA Hincks.

Plate 34, figs. 3, 3*a*, and 3*c*.

Localities.—Shoal Tickle, Labrador, one very young colony on the stem of *Myriozoum coarctatum;* halfway from Mugford to Hebron, Labrador, one mature specimen with zoœcia and avicularia.

Hincks described this species in his Polyzoa of the Queen Charlotte Islands (1882, p. 255) and again commented on it in the Polyzoa of the St. Lawrence (1888, p. 225). He evidently had not seen the ovicells in either the Pacific or Atlantic specimens. One specimen in my possession has these well developed. They are subglobose, rather rough, punctured, prominent, and when adult the secondary raised peristome of the zoœcium is continued upon the front of it like a raised rib. In his original description Hincks states that there are no avicularia though the figure accompanying the description seems to indicate their presence. Later, in his St. Lawrence paper, he is careful to state in regard to these "peculiar projections placed one on each side of the cell at the base of the raised peristome," that "these have much the appearance of avicularia but really are not such." These structures he failed to find in the St. Lawrence specimens. In the specimens collected by Doctor Bryant these structures are sparingly represented, and some of them are undoubtedly avicularia with hinged mandibles, while others seem to have the mandibles suppressed. In fact, in some cases there are merely oblong membranous areas where the avicularia have failed to develop. In my preparations mounted in balsam the structure of the avicularium is unmistakable.

MUCRONELLA VENTRICOSA (Hassall).

Escharoides coccinea var. *ventricosa* VERRILL, 1879*b*, p. 31.

Locality.—Shoal Tickle, Labrador, rare, on shells.

PORELLA CONCINNA (Busk).

Lepralia rubens STIMPSON, 1853, p. 19.
Lepralia belli DAWSON, 1859, p. 256.—PACKARD, 1867, p. 271.
Discopora coccinea RINK, 1877, p. 444.
Porella lævis var. *concinna* VERRILL, 1879*b*, p. 30.

Localities.—Fourteen miles south of Cape Sable, scarce; St. Pierre Bank, Newfoundland, a few on Pecten shells; off Cape Race, Newfoundland, encrusting dead *Buccinum* shells; Shoal Tickle, Labrador, one small colony on a pebble.

PORELLA SACCATA (Busk).

Plate 34, fig. 4.

Eschara elegantula PACKARD, 1863, p. 411; 1867, p. 275.—RINK, 1877, p. 444.
Eschara papposa PACKARD, 1867, p. 270.
Porella elegantula VERRILL, 1879*b*, p. 30.—WHITEAVES, 1901, p. 104.

Localities.—South by east from Burin, Placentia Bay, Newfoundland, a few fragments; off Cape Race, Newfoundland, scarce; Shoal

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Tickle, Labrador, several colonies; off Beachy Island, between Flint Island and Cape Mugford, Labrador, a few colonies representing the nominal variety *rostrata;* outside of Hebron, Labrador, several colonies.

This is the species commonly known as *Porella elegantula.* It is not the species described by d'Orbigny under that name, however, according to Waters (1900, p. 81) who examined the type-specimen of *elegantula* in Paris. Busk's name, *saccata,* therefore becomes the proper name for this species. The *Porella elegantula* of d'Orbigny (1851, p. 102) is an unrecognized species from Newfoundland, unless, as Waters (1900, p. 81) points out, *P. perpusilla* (Busk) should prove to be a synonym.

PORELLA PERPUSILLA (Busk).

Plate 34, figs. 5, 5*a*, and 5*b*.

Eschara perpusilla BUSK, 1881, p. 236, pl. 13.

Locality.—Outside of Hebron, Labrador, at 80 fathoms on gravel bottom, one specimen about three-fourths of an inch in height. The species has not been recorded since Busk described it.

The single specimen taken by Doctor Bryant agrees in all essentials with the description given by Busk. As the species has not heretofore been recorded in American waters, I quote Busk's description in a somewhat abbreviated form.

Zoarium diminutive, constituted of irregularly forked branches. Stem and lower part of branches cylindrical, toward the ends flattened. Zoœcia fusiform elongate, mouth horizontal, anterior lip tridentate, the median denticle wide and expanding, the lateral pointed, conical; immediately in front of the median denticle an avicularium about half the length of the zoœcium, with a circular mandible. At first sight this form might be regarded as a very dwarf variety of *E. elegantula.* The characters by which *E. perpusilla* may be recognized are:

1. The smaller size of the zoarium, which probably does not exceed an inch in height, and the cylindrical form, for the most part, of the stem and branches.
2. The smaller dimensions of the avicularium and more especially of its mandible.
3. The tripartite dentition of the anterior or inferior lip.
4. The immersion of the mouth and of the orifice of the avicularium in the older stages of growth, these parts in the stem and lower part of the branches being entirely overgrown and obliterated.

The median denticle is developed below the oral avicularium in the same manner as that of *P. concinna,* while the lateral denticles are merely lappet-like folds of the peristome. The species is evidently related to *P. saccata,* but is sufficiently different to rank as a distinct species. It was originally recorded from the Arctic Sea at 13 to 15 fathoms, Franklin-Pierce Bay and Smiths Sound.

The species should be carefully compared with the type of d'Orbigny's *elegantula,* which also has rounded branches, but until this is done it is better to record the species as above.

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PORELLA PROBOSCIDEA Hincks.

Porella proboscidea HINCKS, 1888, p. 223.
Eschara verrucosa RINK, 1877, p. 444.
Porella verrucosa VERRILL, 1879*b*, p. 30.

Localities.—Fourteen miles south of Cape Sable, a few colonies on hydroid stems; Shoal Tickle, Labrador, several colonies. At the latter place occurred one colony the form of which resembled that of of *Porella saccata*, but the zoœcia were typical of *proboscidea*. This species usually grows on hydroid or other stems and seldom on rocks or shells, and assumes a more or less erect, irregularly folded, frill-like form. In the variation above mentioned the colony is branching and the divisions are ligulate.

PORELLA SKENEI (Solander).

Lepralia crassispina STIMPSON, 1853, p. 18.
Eschara skenei WHITEAVES, 1874, p. 11.
Discopora skenei RINK, 1877, p. 444.
Discopora skenei and var. *crassispina* VERRILL, 1879*b*, p. 30; 1880, p. 194.
Palmicellaria skenei BIDENKAP, 1905, p. 27.

Localities.—Forty miles west by south from Cape Sable, one colony; 14 miles south of Cape Sable, several; Browns Bank off Cape Sable, 1 colony.

This species is placed by many authors in the genus *Palmicellaria*, but its relations seem to the writer closer to *Porella*, in which genus Hincks has placed it. Both erect and encrusting stages of the species occur in the collections.

PORELLA STRUMA (Norman).

Localities.—Fourteen miles south of Cape Sable, several colonies; Browns Bank off Cape Sable, several colonies, some more than an inch across and all encrusting.

PORELLA PROPINQUA (Smitt).

Porella verrucosa var. *propinqua* VERRILL, 1879*b*, p. 30.
Smittia propinqua BIDENKAP, 1905, p. 26.

Localities.—Forty miles west by south from Cape Sable, one colony; 14 miles south of Cape Sable, several colonies; Browns Bank off Cape Sable, one colony.

This species is another that has been shifted about from *Porella* to *Smittia* and back again according to the opinion of the author. The present writer prefers to place it tentatively in the genus *Porella* on account of the round oral avicularium.

SMITTIA PORIFERA (Smitt).

Escharella porifera RINK, 1877, p. 444.
Smittia landsborovii var. *porifera* HINCKS, 1888, p. 225.

Localities.—Fourteen miles south of Cape Sable, rare; Shoal Tickle, Labrador, one colony encrusting a pebble.

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SMITTIA RETICULATOPUNCTATA (Hincks).

Locality.—Fourteen miles south of Cape Sable, one colony attached to a hydroid stem.

SMITTIA TRISPINOSA (Johnston).

Lepralia trispinosa PACKARD, 1863, p. 406.
Escharella jacotini SMITT, 1873, p. 59.—RINK, 1877, p. 444.
Mucronella jacotini VERRILL, 1879*b*, p. 31; 1880, p. 195.

Localities.—Fourteen miles south of Cape Sable, common; Browns Bank off Cape Sable, abundant on Buccinum shells, on *Porella saccata* and on *Cellepora surcularis;* off Cape Race, Newfoundland, rare; Shoal Tickle, Labrador, one colony showing the characters of the variety *jeffreysi* on *Escharoides sarsii.* Some of the Cape Sable specimens approach the variety *nitida* of Verrill (see Osburn, 1912, p. 246) in some respects but all have the pointed avicularia at the side of the zoœcial aperture as in the typical form.

RHAMPHOSTOMELLA COSTATA Lorenz.

Cellepora scabra (part) VERRILL and SMITH, 1873, p. 714.—WHITEAVES, 1874, p. 5.—RINK, 1877, p. 444.
Mucronella scabra (part) VERRILL, 1879*b*, p. 30; 1880, p. 196.

Localities.—Fourteen miles south of Cape Sable, several colonies; half way from Mugford to Hebron, Labrador, scarce; off Beachy Island between Flint Island and Cape Mugford, Labrador, scarce; Shoal Tickle, Labrador, several small colonies. The last mentioned show the characters of the nominal variety *cristata* Hincks in some of the more highly calcified zoœcia.

RHAMPHOSTOMELLA OVATA (Smitt).

Mucronella ovata VERRILL, 1879*b*, p. 30; 1880, p. 195.

Localities.—Fourteen miles south of Cape Sable, several colonies; Shoal Tickle, Labrador, one young colony.

RHAMPHOSTOMELLA RADIATULA (Hincks).

Localities.—Fourteen miles south of Cape Sable, one small but well-developed colony.

This species has not previously been listed for North American waters, but has been taken at Iceland.

ESCHAROIDES SARSII (Smitt).

Eschara lobata PACKARD, 1863, p. 408; 1867, p. 68.
Escharopsis lobata VERRILL 1879*b*, p. 31; 1880, p. 196.

Localities.—Fourteen miles south of Cape Sable, a few colonies; Shoal Tickle, Labrador, one colony; outside of Hebron, Labrador, one colony. Both erect and encrusting stages were present.

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Suborder CTENOSTOMATA.

BOWERBANKIA GRACILIS var. CAUDATA (Hincks).

Locality.—Browns Bank off Cape Sable, one small colony spreading on the stem of a hydroid.

As shown by the writer (Osburn, 1912, p. 253) the *caudata* of Hincks (1877, p. 215) intergrades with Leidy's *gracilis* (1855, p. 10) and is worthy only of varietal rank. The species with its variety is common on the North American coast as far south as Florida, but has not heretofore been recorded as far north as Canada.

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EXPLANATION OF PLATE 34.

Fig. 1. *Cellepora contigua*, showing a young cell without avicularium at edge of colony and more fully developed cells with avicularia.

2. *Lepralia spathulifera*, mature cell denuded of spines and central avicularium.

2*a*. The same, showing central avicularium and spatulate spine and central avicularium (more enlarged) with open mandible.

2*b*. The same, showing variations in form of spatulate spine.

3. *Mucronella prælucida*, infertile cell with avicularium.

3*a*. The same, showing fertile cell, ovicell, and lateral spaces where avicularia have failed to develop.

3*c*. The same, showing avicularium with a partially detached mandible.

4. *Porella saccata*, aperture and oral avicularium seen partially from in front, drawn to the same scale as fig. 5*a*.

5. *Porella perpusilla*, cross-section of rounded stem showing manner of calcification.

5*a*. The same, aperture, oral avicularium and denticles, drawn to the same scale as fig. 4.

5*b*. The same, details of young cells with ovicells in different stages of development.

The figures are from camera lucida drawings by the author.

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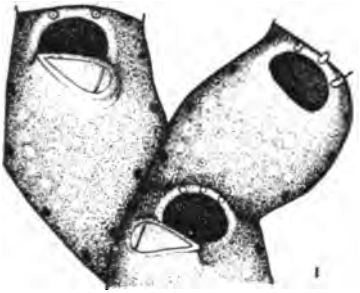

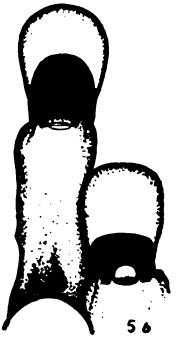

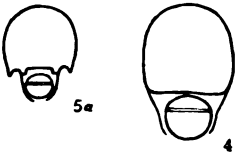

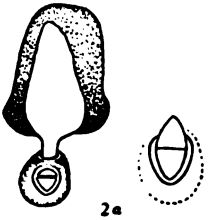

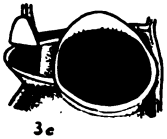

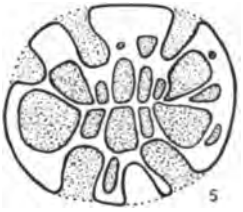

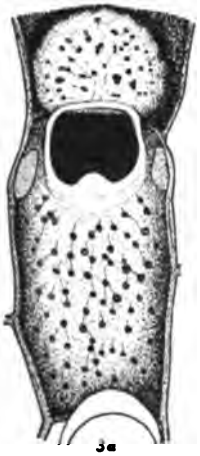

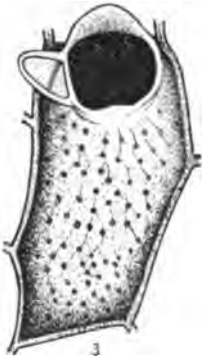

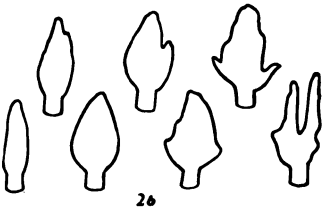

BRYOZOA FROM LABRADOR, NEWFOUNDLAND, AND NOVA SCOTIA

FOR EXPLANATION OF PLATE SEE PAGE 289.

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NEW AMERICAN DIPTEROUS INSECTS OF THE FAMILY PIPUNCULIDÆ

By J. R. MALLOCH,

Of the Bureau of Entomology, United States Department of Agriculture.

While residing in Medicine Hat, Alberta, last autumn, I collected a number of specimens of Diptera, which I have turned over to the United States National Museum. Among them were some specimens of Pipunculidæ, which an examination proved were unrepresented in the collection and were also undescribed. It has always been my desire to make my specimens more useful by having them identified before turning them over to any museum, and I am taking this opportunity to describe the three new species of *Pipunculus* from Alberta, Canada, together with some of those undescribed in the collection of the United States National Museum from other parts of America.

I may mention here that I consider that Dr. Garry de N. Hough was mistaken in supposing that *reipublicæ* Walker is identical with *fuscus* Loew, which view was also adopted by Cresson. It is far more likely, and I believe it to be, the species described by Cresson as *atramontensis* Banks. Reference to Walker's original description discloses the fact that he describes it as having the "abdomen brassy black, thinly clothed with white down, poisers pale yellow" and "legs tawny with a black band at base of each thigh."[1] In the original description of *fuscus* Loew the legs are given as having the femora black except at bases and apices, which is very different from Walker's interpretation if he had the same species before him. In the case of *atramontensis* Banks, there is a spot (which may be a more or less complete ring in some cases) at the base of each femur, which is what Walker very probably had before him in *reipublicæ*. This is the only American described species with that peculiar coloration.

PIPUNCULUS OCCIDENTALIS, new species.

Male.—Eyes rather widely separated, the frontal stripe wider at midway between antennæ and ocelli than frons at above antennæ, no raised central frontal ridge, frons silvery, the silvering gradually

[1] Walker, List of Dipt., vol. 3, 1849, p. 639.

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disappearing on upper part of lower half, upper half of frontal stripe polished, occiput shining black above, silvered on lower portions, antennæ black, third joint elongate and sharply acuminate, whitish on apical acuminate portion, arista swollen at base, brownish black, thorax gray-dusted, particularly on margins, very few hairs present, pleuræ distinctly gray-dusted, scutellum shining except at base, a few very weak marginal hairs present, abdomen ovate, shining, except on lateral margins of all segments, first segment very short, gray dusted dorsally, comb black, bristles not very long nor numerous, hypopygium viewed from above nearly as long as fifth segment, symmetrical, only the terminal lobe visible, ventral organs concealed; legs black, extreme apices of femora, apices and bases of tibiæ and tarsi yellowish, no noticeable bristles present, the pubescence short and not particularly thick nor noticeable, tibiæ and femora more or less gray dusted; wings grayish, inner cross vein at just beyond end of first vein, and at rather less than one-third from base of discal cell, stigma colored; halteres fuscous.

Length, 2 mm.

One male, Medicine Hat, Alberta, Canada. October, 1911, (Malloch).

Type.—Cat. No. 14800, U.S.N.M.

Allied to *affinis* Cresson, *loewii* Kirby, and *dubius* Cresson, but in the descriptions of these species by Cresson [1] there are many distinctions from the above, one of which lies in the distinctly separated eyes in the male of this species.

PIPUNCULUS TOWNSENDI, new species.

Male.—Eyes confluent for a longer distance than the length of the frons, frons without distinct silvering, face silvered, as broad as frons at above antennæ, nearly parallel-sided, antennæ black-brown, third joint not twice as long as broad, very little acuminate at apex, arista lanceolate at base and distinctly tapering for the greater part of its length, occiput much less swollen than in most of the species in the group, and descending rather abruptly behind vertex, silvered on lower portions, but not above, thorax shining black, with distinct white hairs which are longest and most numerous on the lateral margins, humeri yellow; pleuræ brown, gray-dusted; scutellum shining black, without distinct hairs; abdomen shining black, the bases of all segments except first with broad, dull, velvety brown fasciæ, that on fifth segment produced centrally on posterior margin, fifth segment gray-dusted low down on lateral margin, second segment with a comb of numerous long, soft pale hairs, second segment narrower than first and tapering posteriorly, not more than two-thirds as wide at apex as third segment at apex, third segment one-third

[1] Trans. Amer. Ent. Soc., vol. 36, 1910, pp. 282-285.

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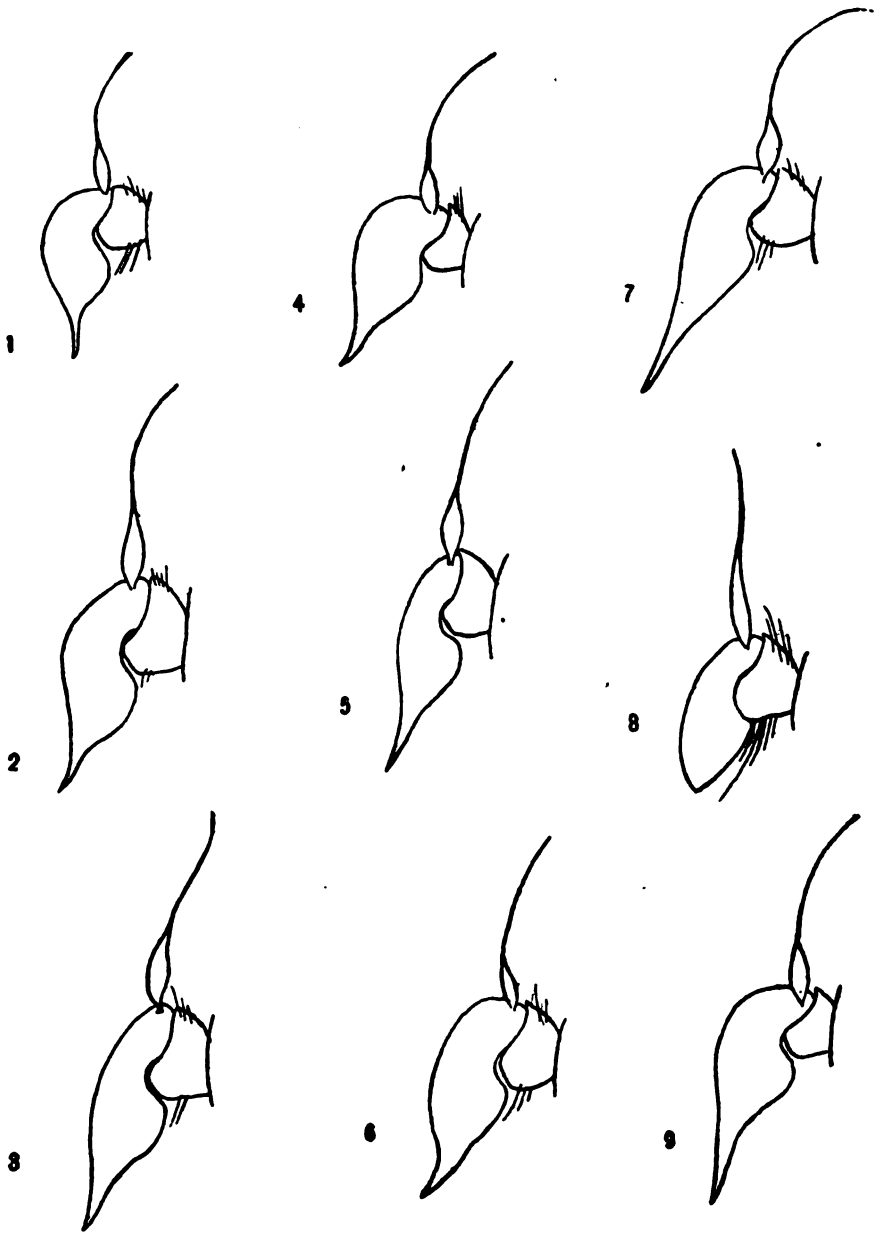
broader at apex than base, fourth and fifth of equal width with apex of third, all segments with distinct, soft, white hairs, more distinct



ANTENNAE OF 1, PIPUNCULUS TRICHÆTUS; 2, P. STIGMATICA; 3, P. CAUDELLI; 4, P. METALLESCENS; 5, P. EXILIS; 6, P. INCONSPICUUS; 7, P. OCCIDENTALIS; 8, P. TOWNSENDI: 9, P. TROCHANTERATUS.

and longer laterally, hypopygium rather more than half as long as fifth segment, with a distinct depression to right, ventral processes

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indistinct, femora black-brown except at extreme apex, tibiæ yellow, tarsi yellow, except bases of joints 2–4 and all of last joint which are brown, all femora with a double row of short blunt spines on apical third of ventral surfaces, mid and hind femora with long, soft, pale hairs on posterior surfaces and the femora with a group of bristles on same surface at apical third; wings clear, stigma distinct, third and fourth costal divisions of about equal length, inner cross vein slightly before end of auxiliary vein and at less than one-third from base of discal cell; halteres yellow.

Length, 4 mm.

One male, White Mountains, Rio Ruidoso, New Mexico, 6,500 feet, July 30 (collector, C. H. T. Townsend).

Can not be confounded with any other described species, because of the peculiarly shaped abdomen.

Type.—Cat. No. 14801, U.S.N.M.

PIPUNCULUS STIGMATICA, new species.

Male.—Eyes confluent for as long as length of frons, frons silvery, face as broad as frons above antennæ, parallel-sided, silvery, antennæ black, third joint elongate and distinctly acuminate, silvered, arista elongate oval at base, and shining black, occiput silvered, less distinctly so on upper portion, thorax silvery gray-dusted on anterior margin, brownish dusted on disk, humeri brownish, pleuræ and lateral margins of thorax distinctly whitish dusted, thoracic hairs weak, scutellum dusted at base, the usual hairs very indistinct; abdomen subopaque, first segment gray-dusted dorsally, lateral comb represented by very numerous, weak, pale hairs, other abdominal segments without distinct dusting but all with scattered short pale hairs, longer and more numerous laterally, hypopygium without cleft, rather longer on right side, ventral processes small, inconspicuous, yellowish; legs black, extreme apices of femora and bases of tibiæ yellow, tarsi tawny, claws, except at apex, and pulvulli yellow, no distinct bristles, those on ventral surface of mid femora very short and inconspicuous, tibiæ with pubescence, especially the ventral surface of hind pair; wings clear, costa thickened slightly at from end of auxiliary vein to end of first vein, stigma dark brown but very short, and looking like a swelling of costa, third division of costa but little more than half as long as fourth, small cross vein at distinctly beyond end of auxiliary and at less than one-third from base of discal cell, outer cross vein at three-fourths its own length from end of fifth vein, outer portion of fourth vein not much bent; halteres brown.

Length, 3½ mm.

One male, Kaslo, British Columbia, 16–7–'03 (A. N. Caudell).

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Allied to *P. loewii*, Kertesz, but easily separable by the characters given above.

Type.—Cat. No. 14802, U.S.N.M.

PIPUNCULUS EXILIS, new species.

Male.—Eyes distinctly separated, the frontal stripe nearly as wide as frons above antennæ, glossy black with a raised central ridge which projects wedge like into the upper half of the silvered frons, face broader than frons at above antennæ, silvered, antennæ with basal joints black, third joint elongate acuminate, the apical acuminate portion rather longer than the thick basal portion, the whole joint with silvery pubescence which gives it, especially toward the tip, a white shining appearance, arista swollen and shining black at base; occiput silvered on lower portion but shining black on upper third and without any silvering at the vertex; thorax with a few pale scattered hairs, distinctly shining, no noticeable dusting anywhere, pleuræ distinctly-gray dusted; abdomen shining, elongate, slightly broader apically, first segment entirely gray-dusted, the lateral comb of hairs long and yellowish, remaining segments only indistinctly gray-dusted low down on lateral margins, hypopygium small, symmetrical, viewed from above only about one-fourth as long as fifth segment, a distinct depression on right side, ventral processes small and inconspicuous; legs black, only the extreme apices of femora and bases of tibiæ yellowish, tarsi paler, noticeably so beneath except the terminal joint, all tibiæ with pale pubescence, the ventral surfaces of hind tibiæ very thickly covered with short pale hairs, a few pale hairs on ventral surface of hind femora at apical third, no noticeable bristles anywhere; wings clear, inner cross vein distinctly before end of first vein and about one-fifth from base of discal cell, outer cross vein about one-half its own length from end of fifth vein, halteres with stalk brown and knob yellow.

Length, 3 mm.

One male, Medicine Hat, Alberta, Canada (Malloch).

Type.—Cat. No. 14803, U.S.N.M.

Allied to *subvirescens* Loew, but this has the eyes in contact; *subnitens* Cresson, which has the fourth and fifth segments noticeably gray-dusted, but not the first especially, and *scoparius* Cresson, which has the lateral comb on first segment long and black.

PIPUNCULUS INCONSPICUUS, new species.

Female.—Frons widest at middle, where it is about one and one-half times as broad as at above antennæ, nearly as broad at vertex as at antennæ, silvered at lower half, dull black above, face dis-

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tinctly silvered, narrower than frons and of nearly uniform width. Occiput silvered below but on upper portion black, antennæ black, third joint elongate and distinctly acuminate, silvered, especially apically, arista swollen and glossy black at base; thorax slightly gray-dusted, with scattered pale hairs, humeri whitish, with distinct, long, downy, pale hairs, pleuræ gray-dusted, scutellum gray-dusted and with very few weak hairs, squamæ white; abdomen short and broad, tapering toward apex, subopaque, first segment gray-dusted laterally, and with distinct lateral comb, other segments only indistinctly gray-dusted low down laterally, a few scattered hairs in the last three segments, ovipositor long, reaching to second ventral segment, distinctly longer than its base; legs black, only knees, bases of tarsi, claws and pulvilli yellowish, no distinct leg bristles and but little pubescence present, wings clear, inner cross vein distinctly beyond end of first vein and middle of discal cell, outer cross vein slightly shorter than last portion of fifth vein; halteres with brown pedicel and whitish yellow knob.

Length, barely 2 mm.

One female, Medicine Hat, Alberta, Canada, October, 1911 (Malloch).

Type.—Cat. No. 14804, U.S.N.M.

Very close to *subnitens* Cresson, which is represented by a female from Victoria, Texas, in collection. This latter stood as *aridus* Williston, in collection, but it agrees with Cresson's description of *subnitens*. The above species differs from that of Cresson in having no distinct bristles at base of fore femora, in venation, and in color of legs.

PIPUNCULUS TRICHÆTUS, new species.

Female.—Frontal stripe broadest at middle, distinctly silvered on lower two-thirds, a distinct raised central tuberculate central point on lower third of frons, face nearly as wide as frons at above antennæ at upper edge, widening toward mouth edge, antennæ black-brown, third joint with its apical third forming an elongate acuminate point, grayish on acuminate portion, arista swollen at base, elongate oval, occiput silvered below and on sides; thorax opaque, distinctly gray pollinose anteriorly, humeri brown, lateral margins of thorax with several long pale hairs in front of wing base, pleuræ distinctly gray pollinose, scutellum shining black, two or three weak, black hairs on posterior margin, postnotum gray pollinose; abdomen subopaque, short and broad, basal segment gray pollinose, the lateral comb consisting of numerous long black hairs, second segment nearly entirely gray pollinose, other segments with very distinct lateral gray pollinose spots forming shortly interrupted hind marginal fasciæ, only a few very short pale hairs scattered over abdomen, ovipositor of medium

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length, reaching to apex of second segment, as long as its globose base; legs black, trochanters, bases and extreme apices of femora, bases of tibiæ, and tarsi yellow, remainder of tarsi brown, all legs distinctly gray pollinose, especially the femora posteriorly, mid femora with distinct white hairs posteriorly, femoral bristles short but distinct, all tibiæ and tarsi with distinct, pale, strong hairs, hind tibiæ with a slight bend, thickened on apical two-thirds, three very distinct, long, pale, serial bristle-like hairs on antero-dorsal surface at middle; wings clear, stigma brown, the small cross vein at slightly beyond end of auxiliary vein and at two-fifths from base of discal cell, third and fourth costal divisions of nearly equal length, outer cross vein at nearly its own length from end of fifth vein; halteres brown.

Length, 2½ mm.

One female, Mount Washington, New Hampshire (Mrs. Slosson).

Type.—Cat. No. 14808, U.S.N.M.

Easily known by the hind tibial bristles from any other species.

PIPUNCULUS TROCHANTERATUS, new species.

Male.—Eyes touching for a short space, less than half the length of frons, frons silvered, face silvered, as wide as frons at above antennæ, parallel-sided, antennæ black, paler and rather whitish toward tip of third joint, third joint acuminate, more than twice as long as broad at broadest part, arista swollen at base, glossy brown, occiput black above, slightly silvered on lower portion; thorax shining, with two rows of weak hairs on disk, humeri whitish yellow, with several long hairs, pleuræ slightly gray pollinose, a rather distinct gray pollinose patch on lateral margin of thorax anterior to base of wing, scutellum shining, nearly bare; post-notum very distinctly gray pollinose laterally; abdomen black with a slight bronze tinge, subshining, first segment very short dorsally, lateral margins whitish, the lateral comb consisting of long pale hairs, fifth segment slightly gray pollinose laterally, last two segments with scattered hairs, those on the fifth rather numerous and strong, hypopygium in type specimen exserted and contorted so that it is impossible to state what its normal appearance is, but it is entirely black and devoid of long hairs; legs black, extreme apices of femora, bases of tibiæ and tarsi yellow, last joint of tarsi brown, hind trochanter with a distinct tubercule on the postero-ventral surface, the femora with 2–3 weak bristles at base, fore and mid femora normal, hind femora much thickened on apical half, with a few hairs on antero-ventral surface, hind tibiæ bent, thickened ventrally at middle, then distinctly hollowed ventrally before apex, pubescent on ventral surface at near tip, hind metatarsi thickened; wings clear, third section of costa less than one-third the length of fourth, small cross vein at slightly beyond end of

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first vein and middle of discal cell, outer cross vein at two-thirds its own length from tip of fifth vein, third and fourth veins parallel for about one-third the length of last section of fourth vein; halteres entirely yellow.

Length, 2½ mm.

One male, Kaslo, British Columbia (R. P. Currie).

Allied to *unguiculatus* Cresson.

Type.—Cat. No. 14806, U.S.N.M.

PIPUNCULUS METALLESCENS, new species.

Male.—Black; eyes touching for as long a space as half the length of frons, frons silvered, face silvered, as broad as frons at above antennæ, parallel-sided, antennæ black-brown, third joint barely twice as long as its greatest breadth, shortly but sharply acuminate and not distinctly paler at apex, arista with glossy brown, oval swelling at base, occiput very distinctly silvered, except just behind ocelli; thorax gray brown pollinose, whitish on the lateral margins, nearly bare, pleuræ yellow, with short pale hairs, scutellum glossy black except at base, and almost bare, post-notum distinctly gray pollinose especially laterally; abdomen short and broad, with a distinct greenish luster, lateral comb on first segment strong and black, all segments with scattered short hairs, hypopygium with distinct cleft to right, viewed laterally longer than fifth segment, but from above only half as long, ventral processes concealed; legs black, trochanters slightly, extreme apices of femora, basal third and extreme apices of tibiæ, and all tarsi except last joint yellowish, no large bristles anywhere, those on mid femora on apical half of ventral surfaces very small; wings clear, third division of costa above one-half as long as fourth, small cross vein at opposite midway between end of first and second veins and distinctly beyond middle of discal cell, outer cross vein at nearly its own length from end of fifth vein; halteres yellow.

Length, 2 mm.

One male, Chinandega, Nicaragua (C. F. Baker).

Belongs to the *subvirescens* group.

Type.—Cat. No. 14807, U.S.N.M.

PIPUNCULUS CAUDELLI, new species.

Male.—Eyes separated by a narrow, black frontal stripe which at its narrowest part is about one-third as broad as frons at above antennæ, the raised central ridge narrowly intersecting the upper half of the silvered frons, face broader than frons, silvery, widening toward mouth, antennæ black except the apical half of third joint which tapers to an acuminate apex and is yellowish white, occiput silvered except above and the ocellar region which is shining black,

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thorax shining black, the usual hairs very indistinct, pleuræ gray-dusted, scutellum with distinct pale pubescence, longest and most distinct on posterior margin; abdomen shining black, broader toward apex, first segment very short, dorsally only one-fourth as long as second, silvered on lateral margins, lateral comb pale, all segments, but especially the fourth and fifth, with scattered short hairs which are most distinct on sides, hypopygium short, symmetrical, with a large central depression, ventral process exposed, yellow; legs yellow, femora black except at extreme apex, all tibiæ with a ring-like mark on middle which does not extend completely over dorsal surface, and extends to about one-third the length of tibiæ, all tibiæ with distinct, short, pale pubescence, especially noticeable on hind pair which are rather bent, hind femora with only a few pale short hairs, no noticeable bristles anywhere; wings clear, small cross vein before the end of auxiliary vein, and at about one-seventh from base of discal cell, outer cross vein nearly its own length from end of fifth vein; halteres yellow except at extreme base.

Length, 3½ mm.

Two males, Kaslo, British Columbia, July 16, 1903 (A. N. Caudell).

Near to *flavomaculatus* Hough, but the abdomen is not anywhere yellow as in that species. Easily separated from any of the other species in the *subvirescens* group by its neuration, the inner cross vein being very near to the base of the discal cell.

Type.—Cat. No. 14805, U.S.N.M.

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DESCRIPTIONS OF NEW GENERA AND SPECIES OF MUSCOID FLIES FROM THE ANDEAN AND PACIFIC COAST REGIONS OF SOUTH AMERICA.

By CHARLES H. T. TOWNSEND,
Chief of the Estación de Entomología, Lima, Peru.

The present paper contains descriptions of 72 species of muscoid flies from South America, all collected by myself except as otherwise noted. Among these are the types of 37 genera, which are duly characterized. Very many of these forms have been the subjects of dissections and studies in the female reproductive system, reproductive habit, egg and first-stage maggot, and their naming and characterization are thus especially called for. A preliminary paper containing some of these species and giving some of the results of these studies was published in the Annals of the Entomological Society of America.[1] A few of the forms studied have also been referred to in a paper reviewing Pantel's last work and published in the Proceedings of the Entomological Society of Washington.[2] Since the species named in these two papers were described only by giving characters of the female reproductive system, full descriptions of the adults are included in this paper.

The types of all the forms here described are deposited in the U. S. National Museum collections. I have taken the precaution to make the particular specimens which furnished the dissections already referred to and which will be fully described and figured in a forthcoming completed paper the actual type-specimens of the species, so that no doubt may hereafter arise as to the identity of the forms treated and figured. A separate TD number, meaning Townsend–Dissection number, is given to each specimen of fly dissected or otherwise connected with the study of the reproductive system, habit, and early stages, and in every case the dissections and early stages obtained from a particular individual fly bear its TD number. The early-stage and reproductive-system material obtained by dissection may thus at any time be referred to the individual adult specimen whence it came. The type-specimens that have been dissected are duly noted in the fol-

[1] Vol. 4, 1911, pp. 127–152 and 328–329.

[2] Vol. 13, 1911, pp. 151–170.

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lowing text by TD numbers. The dissections of same that will be figured in the above-mentioned completed paper are noted as *f. r. s.* = female reproductive system, *e.* = egg, *ch.* = chorion, *m.* = first-stage maggot, and *cph. sk.* = cephalopharyngeal skeleton of first-stage maggot. All published references to the forms described are cited in the text under the name employed in the reference, including the TD number when that was given.

Family PHASIIDÆ.

Subfamily ECTOPHASIINÆ.

XANTHOMELANODES PERUANUS Townsend.

Xanthomelanodes peruanus TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 128.—TD 3983.

Length of body, about 5.75 to 6.75 mm.; of wing, 4.5 to 5.5 mm. Numerous specimens of both sexes, Piura, Peru, July 17, 1910, on foliage; October 31 to November 6, 1910, on flowers of *Mikania*, sp., and noted abundantly on latter through November.

Head of male deeply golden pollinose, the parafrontals most strongly so; that of female silvery with a faint golden shade on parafrontals. Occiput ashy, deep golden on upper half in male. Frontalia velvet-brown; antennæ brown. Palpi yellowish, dusky at extreme tip. Only one vibrissa on each side. Thorax deep golden pollinose in male, silvery in female with a faint golden shade on mesoscutum, the usual four velvet-black vittæ present. Scutellum wholly blackish. Abdomen golden pollinose in male, silvery in female, the ground color in both pale yellowish, with brown median posterior triangles on segments two to five, and the shortened first segment wholly brown. The triangles vary, and are sometimes more or less obsolete on the second and fifth segments in the female. Legs wholly blackish. Wings infuscated, most strongly so on costal half. Apical cell closed in tip of wing. Tegulæ of male distinctly yellow, those of female faintly so.

Type.—Cat. No. 15140, U.S.N.M. Female, November 6, 1910; TD 3983, *f. r. s.*

Cotype, female, July 17, 1910; TD 3931, *e.*

Deposits flat-oval macrotype eggs on host, without incubation.

This species is probably parasitic in the adults of *Stenomacra*, sp. (near *limbatipennis* Stal; determined by Heidemann). I have repeatedly found in the abdomen of adults of this lygæid second and third stage maggots which I believe to be this species. The host is exceedingly abundant in the valley of the Rio Piura, on *Prosopis dulcis* and on species of *Gossypium*, attacking the fruits of both.

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Family EXORISTIDÆ.

Subfamily EXORISTINÆ.

EUPHOROCERA PERUVIANA, new species.

Tricholyga, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 131 and (*Euphorocera*) 328.—TD 3971.

Euphorocera peruviana TOWNSEND, Proc. Ent. Soc. Wash., vol. 13, 1911, p. 153. [*nomen nudum*].

Length of body of female, 10 to 11 mm.; of wing, 8 to 9 mm. Length of body of male, 14 to 15 mm.; of wing, about 10 mm. Numerous specimens of both sexes, Piura, Peru, October 28 and through November, 1910, on trunks of mesquite.

Facial plate and parafacials silvery-white pollinose, parafrontals pale golden pollinose. Antennæ blackish, first two joints and palpi reddish-yellow. Thorax, scutellum, and abdomen thickly cinereous pollinose, the mesoscutum with the usual five vittæ, the scutellum with the reddish ground color showing through the pollen. Female with first abdominal segment and indefinite hind borders of others black and less thickly pollinose. The abdomen of male is broadly reddish on sides of first to third segments. The anal segment in both sexes is the most thickly pollinose. First and second segments with a median marginal pair of short macrochætæ in both sexes, third segment with a marginal row of stronger ones. Wings clear, the basal costal area faintly straw-yellowish.

Type.—Cat. No. 15141, U.S.N.M. Female, October 28, 1910; TD 3971, *f. r. s.*

Deposits flat-oval macrotype eggs on host, without incubation.

EUPHOROCERA MINOR, new species.

Euphorocera minor TOWNSEND, Proc. Ent. Soc. Wash., vol. 13, 1911, p. 153. [*nomen nudum*].

Length of body, 7 mm.; of wing, 5 mm. Several females, Chapairá and Piura, in valley of Rio Piura, Peru, January 4 to May 21, 1911, on mesquite trunks and vegetation.

Differs from *E. peruviana* in its uniform small size and in the greater contrast of the black and pollinose portions of the body. The wing-bases lack the yellowish shade almost entirely.

Type.—Cat. No. 15142, U.S.N.M. Female, Chapairá, May 21, 1911; TD 4058, *f. r. s.*

Deposits flat-oval macrotype eggs on host, without incubation.

PLAGIOPS, new genus.

Plagiops comes near *Plagiprospherysa*, *Deuterammobia* (type, *Ammobia glabriventris* Wulp), and *Stomatomyia*, on external adult characters, running there in Brauer and Bergenstamm's tables. It may

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be distinguished from *Stomatomyia* by the eyes being thinly but distinctly hairy. The type of *Stomatomyia* is *S. filipalpis* Rondani, hereby designated. It has discal and marginal macrochætæ, while *Plagiops* has only marginal. From *Deuterammobia* it differs in the palpi being short, small, and filiform. From *Plagiprospherysa* it differs in the distinctly but thinly hairy eyes. In the female the vertical and next three pairs of frontal bristles are differentiated by being stronger than the anterior frontal bristles; in the male the vertical and next two pairs only have this character.

Reproductive habit, oviposition on host of small flat-oval macrotype eggs, without incubation; uterus absent.

Type-species.—*Plagiops meridionalis*, new species.

The following table will separate these forms:

1. Palpi rudimentary, short, small, filiform.....2
   Palpi filiform, but elongate; eyes thickly hairy, macrochætæ discal and marginal.....*Stomatomyia.*
   Palpi normal, somewhat thickened at tip, eyes bare or nearly so..*Deuterammobia.*
2. Eyes bare.....*Plagiprospherysa.*
   Eyes very distinctly but not thickly haify, macrochætæ only marginal in both sexes.....*Plagiops.*

PLAGIOPS MERIDIONALIS, new species.

Length of body, 6 to 7 mm.; of wing, 4 to 5 mm. The males are the larger. Two females and one male, Piura, Peru, June 11, 1911, on foliage.

Parafrontals in both sexes silvery pollinose with a faint golden tinge, the golden being usually more pronounced in female. Frontalia rust-yellow, first two antennal joints reddish-yellow, third joint and arista dark brown in male but the base of third joint in female reddish-yellow. Parafacials, cheeks, facial plate, and orbits silvery-white. Occiput silvery with gray pile, upper portions faintly golden. Palpi yellowish. Pleuræ and humeri deeply silvery; mesoscutum and scutellum with pollen of a faint golden shade, five vittæ on former, the outer ones interrupted at suture, the next ones abbreviated at less than halfway behind suture; edges of scutellum yellowish. First abdominal segment blackish, the other three segments densely silvery pollinose with the same faint golden shade as front and thoracic scutum, leaving an irregular broad posterior margin of shining blackish. Legs dark brown, front femora pollinose exteriorly. Wings clear, tegulæ whitish.

Type.—Cat. No. 15143, U.S.N.M. Female, June 11, 1911; TD 4064, *f. r. s.*

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EUMYOTHYRIA MERIDIONALIS, new species.

Eumyothyria, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 131.—TD 3981.

Length of body, 7 mm.; of wing, 7 mm. Two females, Piura, Peru, November 5 and 12, 1910. One on flowers on *Mikania*, sp., the other on mesquite trunk.

Parafrontals and parafacials light golden pollinose, the facial plate with pollen of a lighter shade. Frontalia pale brown; antennæ brown, the first two joints and base of third reddish-yellow. Palpi pale reddish-yellow. Occiput cinerous pollinose, the orbits faintly golden. Thorax, scutellum, and abdomen thickly cinereous pollinose, with a golden shade on abdomen, especially posteriorly; the mesoscutum with the four usual vittæ, the sides of intermediate abdominal segments faintly reddish-yellow anteriorly, the hind borders of segments more or less distinctly and narrowly margined with blackish. Wings clear. Legs blackish. Three postsutural and three sternopleural bristles. Third antennal joint about two and one-fourth times as long as second.

Type.—Cat. No. 15144, U.S.N.M. Female, November 5, 1910; TD 3981, *f. r. s.*

Deposits flat-oval macrotype eggs on host, after incubation in uterus.

EUTHELAIRA, new genus.

Fronto-facial profile much rounded, especially in male, eyes distinctly and fairly thickly hairy. Frontal bristles strong and more or less decussate, descending well below base of antennæ (only to middle of second antennal joint when the antennæ are downwardly exserted and fully to base of third when antennæ are retracted), but not diverging from the parafacial margin. Front of female anteriorly about the width of one eye, a little narrower at vertex; that of male anteriorly fully two-thirds of eye-width, about one-half eye-width at vertex; face gradually widening from front, that of male below more than twice and that of female less than twice vertex-width. Male with one strong pair of reclinate inner orbital bristles in line with frontals; female with same and behind it a strong outwardly directed or divergent inner orbital, with two proclinate outer orbitals. Male with a strong pair of long ocellar bristles, exactly and strongly divergent; female with only a pair of very fine divergent hairs, very delicate and not over one-half the length of the male ocellar bristles. This is one of the few cases known of the ocellar bristles furnishing sexual characters. Facial ridges ciliate nearly to fully halfway up, vibrissæ level with oral margin, latter cut off and not at all prominent. Second antennal joint short, third long and reaching nearly

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to oral margin in both sexes; arista very long and thickened only on extreme base, basal joints short. Inner vertical bristles of ordinary strength, about like frontals or orbitals. Proboscis short and fleshy, palpi elongate and somewhat thickened apically.

Three strong sternopleural bristles, three postsutural. Two strong lateral scutellar pairs, the posterior twice as long as anterior; a strong long decussate apical pair; a very weak discal pair. Scutellum with erect short bristly hairs. Abdomen very elongate and narrow, especially narrowed posteriorly in female. A strong median marginal pair of macrochætæ on first and second segments, six or eight strong marginal in row on third, a discal and marginal row of weak ones on anal segment in female, but strong in male. Legs long, hind tibiæ with irregular bristles and neither ciliate nor pectinate, but subciliate, with very short bristles among the long ones. Claws of female moderately strong, those of male a very little stronger. Tibiæ and femora in general very bristly. Wings long, apical cell widely open just a little before tip of wing, fourth vein rounded at bend and without stump or wrinkle, hind cross vein nearer bend of fourth.

Reproductive habit, host-oviposition; uterus presumably present; eggs flat-oval, macrotype.

Type-species.—Euthelaira inambarica, new species.

This genus seems to approach *Ptilodegeeria*, running there in Brauer and Bergenstamm's tables. It differs in having third vein bristly only at base, facialia ciliate on more than lower one-third, and in the sexual character of the ocellar bristles.

EUTHELAIRA INAMBARICA, new species.

Length of body, 10 to 10.5 mm.; of wing, 8 to 9 mm. Three females and two males, Rio Inambari at junction of its affluent, the Rio Yahuarmayo, foot of eastern slope of Cordillera Oriental in the montaña of southern Peru, about 1,700 feet, February 8 to 11, 1910, on foliage.

Face, cheeks, front, and orbits pure silvery-white, with an almost snow-white shimmer; parafrontals usually faintly golden in middle and posteriorly in female, less so or not at all in male. Occiput cinereous, usually with a brassy tinge, the tergite of sixth segment blackish. Beard gray, not profuse. Frontalia and antennæ black or dark brown. Palpi brownish-yellow. Pleuræ silvery. Mesoscutum and scutellum silvery with a distinct golden tinge, the usual four vittæ fairly distinct. Second and third abdominal segments silvery-white pollinose on basal one-half above and below, the pollen sometimes with a faint suggestion of brassy, the rest of abdomen shining dark brown. Legs blackish, front femora silvery on outside. Wings smoky on costal border and long veins. Tegulæ nearly white,

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often more or less yellowish on margins. One female shows practically no brassy tinge to pollen either on head, thorax, or abdomen.

Type.—Cat. No. 15145, U.S.N.M. Female, February 11, 1910; TD 3936, *e*.

Subfamily PSEUDODEXIINÆ.

Genus OPHIRODEXIA Townsend.

Ophirodexia TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 134, 147.

Belongs in Pseudodexiinæ, and runs to *Doleschalla*, *Graphia*, and *Pachygraphia* in Brauer and Bergenstramm's tables, but differs markedly from these forms. Front about twice length of face, the antennæ inserted far below middle of eyes. Eyes bare, extending lower in male than in female. Front of female fully width of one eye, that of male hardly two-thirds eye-width. Female with two proclinate orbital bristles, none in male. Parafacials and cheeks of female wide, former about one-third and latter about one-half eye-height; those of male narrower, former being less than one-fourth and latter hardly one-third eye-height. Facialia bare save several bristles next vibrissæ. Frontal bristles stopping at base of antennæ. Facial plate small, cut off below, oral margin not prominent, vibrissæ on oral margin. Antennæ reaching nearly to vibrissæ, second joint short. Arista short, densely plumose on both sides in female, less plumose on underside in male. Proboscis very short and fleshy, palpi slender. Ocellar bristles weak, distinct in female but reduced to a pair of delicate hairs in male. Occiput bulged below, especially noticeable in its invasion of cheek-area, sunken above leaving an excavated area between eyes especially noticeable in male.

Two sternopleural and three postsutural bristles. Scutellum with one strong basal lateral bristle, and an apical pair of same strength barely decussate at ends; discal pair hairlike, also a hairlike marginal bristle between the lateral and apical. Abdomen moderately elongated, subconical in male, first segment widest, tapering evenly to apex of anal segment, second and third segments equal in length and longer than others. Abdomen of female a little broadened in middle. First segment with a median marginal pair of very weak macrochætæ, hardly stronger in male than the bristly hairs of abdomen; second segment with a median marginal pair of stronger ones; third and fourth segments with a marginal row of eight or ten bristles, the upper ones strongest and those of third segment longest. Weak marginal bristles on sides of first two segments. Legs not elongate, without strong bristles, tarsi normal, claws and pulvilli moderately short in both sexes. Wings rather narrow; apical cell narrowly open to almost closed, terminating just before extreme wing-apex; apical crossvein lightly bowed in, parallel with the subsinuate hind cross-

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vein which is a little approximated to it; fourth vein usually continued in extremely short stump. Costal spine very small and inconspicuous.

Reproductive habit, larviposition of uncolored maggots on or near host.

Type-species.—*Ophirodexia pulchra* Townsend.

OPHIRODEXIA PULCHRA Townsend.

Ophirodexia pulchra TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 134 and 147.—TD 3999.

Length of body, 6 to 7 mm.; of wing, 4.5 to 5.5 mm. Three males and two females, Piura, Peru, November 12, 1910, to March 7, 1911, on bark of mesquite limbs.

Face, front, and cheeks silvery-white pollinose in both sexes, the cheek-grooves showing yellowish-brown in some lights. Facial plate of a duller shade. Antennæ and palpi brownish-yellow, the plumose hairs of arista blackish. Frontalia dark brown or blackish. Occiput and vertex ashy. Thorax silvery, with a cinereous shade dorsally. Scutellum and lateral posterior edge of mesoscutum, with median spot just behind suture, brown; the posterior two-thirds of third abdominal segment is brown, the tip of anal segment also, and less distinctly a broad median triangle on second segment and a median patch on first brownish. Rest of abdomen pale brownish-yellow, thickly silvery pollinose, the pollen with a tawny shade and showing in broad basal bands on second to fourth segments. Femora and tibiæ brownish-yellow, lightly pollinose; tarsi blackish. Wings infuscated on costal one-third, the infuscation also narrowly following the long veins and crossveins. Tegulæ white.

Type.—Cat. No. 15146, U.S.N.M. Female, November 13, 1910; TD 3999, *f. r. s.*

DIAPHOROPEZA PERUANA Townsend.

Diaphoropeza peruana TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 147.—TD 4026.

Length of body, 6.5 to 7.5 mm.; of wing, 5 to 6 mm. Numerous females, Sullana, Peru, October 1, 1910, to April 11, 1911, on bark of trunk and large branches of tamarind tree in Rio Chira Valley.

Head silvery-cinereous. Frontalia brownish; antennæ reddish-yellow, third joint except base dusky, arista blackish. Palpi pale yellowish. Whole body black in ground color, pleuræ silvery, mesoscutum with three wide silvery vittæ, the middle one continued over scutellum, which it wholly suffuses in some lights. Intermediate abdominal segments silvery-white anteriorly, more broadly so on sides; sides of first segment and all of anal segment except tip silvery. Legs black. Wings faintly infuscated on costal region and

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along veins, clear on inner border. The third antennal joint is four times as long as second.

Type.—Cat. No. 15147, U.S.N.M. Female, April 11, 1911; TD 4026, *f. r. s.*

Deposits uncolored maggots on or near host.

ŒSTROGASTER, new genus.

Head in profile flattened-hemispherical, the oral margin abruptly cut off and scarcely showing, the eyes extending from vertex almost to peristomalia. No palpi, proboscis very short and fleshy. Vibrissæ inserted a little above oral margin, facialia perfectly bare. Parafacials reduced to mere lines, cheeks about as wide as third antennal joint. Front long and narrow, equilateral, about one-sixth greatest width of head. The parafrontals are only a little wider than the parafacials, being about one-half width of frontalia. Antennæ inserted low, face being much shorter than front; arista long and hairlike, enlarged on extreme base. No ocellar bristles. There seem to be two proclinate orbital bristles, indicating the female, but they are almost in line with the frontal bristles, due to the very slight width of the parafrontals.

Two sternopleural bristles and three postsutural bristles. Scutellum with one long nondecussate apical pair, and one long subbasal lateral pair; only short bristles between these. Abdomen subglobose, arched and of unique build, the venter being subcarinate, the external genital opening approximated to posterior edge of first segment, the dorsal sclerites of intermediate segments narrowing rapidly on sides and their posterior margins directed obliquely forward to the hind margin of first segment where they meet on median line. The anal segment is invisible in a direct downward view, but is brought forward on venter in an arched surface extending to the point of meeting on median line of the lateral apices of dorsal sclerites of intermediate segments, the parts bounding genital orifice being evidently a continuation of the abdominal sclerites. A median marginal pair of macrochætæ but no discal on first two segments, the third segment with a discal pair and a marginal row; the anal segment with five or six median pairs in a line which appear to be and may be called discal, but which correspond to the normal discal and apical bristles. Claws and pulvilli short. Apical cell narrowly open in wingtip. Wings broad, fourth vein rounded at bend, hind crossvein in middle between small crossvein and bend. Costal spine hardly at all developed.

Reproductive habit unknown, but judged to be larviposition on or near host.

Type-species.—*Œstrogaster fumosus*, new species.

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ŒSTROGASTER FUMOSUS, new species.

Length of body, 5.5 mm.; of wing, 6 mm. One female, Rio Charape, in the montaña of the east slope of Cordillera Oriental in Province of Jaen, northern Peru, about 5,000 feet, September 12, 1911, on foliage.

Black, lightly silvery. The narrow parafrontals, linear parafacials, facial plate, facialia and orbits are silvery-white pollinose, though appearing blackish in some lights. Occiput and cheeks ashy. Frontalia and antennæ soft black, showing a grayish bloom in some lights. Pleuræ and humeri silvery-white pollinose. The silvery pollen of presutural mesoscutum leaves a median pair of black vittæ confluent anteriorly and a black spot on each side joined by a line with the broadened confluent area in front of the vittæ. The postsutural mesoscutum is broadly silvery pollinose on hind margin, more than anterior half being soft dark brown like the entire scutellum which is without pollen. First abdominal segment wholly dark brown, but with a brassy-cinereous bloom in oblique view; second and third segments broadly silvery-white pollinose on anterior margins, most broadly so on sides and extending on venter, the rest of surface being shining dark brown with the same faint bloom as first segment showing in oblique view; anal segment broadly bordered on each side with silvery-white pollen, brown in middle. Legs brown. Wings lightly infuscated on distal half and costal margin, rest nearly clear; tegulæ deeply yellowish-fuscous, the anterior portion of hind scale and whole of front scale nearly white.

Type.—Cat. No. 15148, U.S.N.M.

Subfamily PYRRHOSIINÆ.

Genus OPHIRION Townsend.

Ophirion TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 134, 146.

Belongs in the group with *Pyrrhosia* and *Micromyobia*. Differs from former genus in the short proboscis, bare arista, narrow front of male, oral margin not prominent, claws of male slightly elongate, etc. Differs from *Micromyobia* in the male being without orbital bristles, male claws a little longer than those of female, etc.

Front of female about or nearly width of one eye, the face being but slightly widened from this; front of male but little more than one-half eye-width, the face below being twice this width. Frontal bristles all reclinate in both sexes except the pair on each side of antennal insertion. Two proclinate orbital bristles in female, none in male. No ocellar bristles in either sex. Frontalia very narrow, parafacials bare and very narrowed below; cheeks a little wider than length of second antennal joint, the eyes descending almost as low as vibrissal angles, which are practically level with the middle of oral

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margin, the latter cut off and not produced. Antennæ nearly reaching oral margin, second joint short; arista enlarged at base, with hardly discernible microscopic pubescence, the basal joints indistinct. Proboscis short and fleshy; palpi normal, elongate and rather slender.

Two sternopleural and two postsutural bristles. Scutellum with one strong basal lateral bristle, a short weak marginal bristle next to it, and a long divergent apical pair; discal small pair atrophied or barely distinct. Both sexes with median marginal pair of bristles of first abdominal segment atrophied but usually distinguishable, second segment with median marginal pair, third with marginal row of about eight stronger ones, anal segment with marginal row of same number of weaker ones. Legs not elongate, with very few bristles. Claws and pulvilli of male but little longer than those of female, which are themselves slightly elongate. Apical cell ending just before extreme wingtip, narrowly open, sometimes almost closed. Fourth vein gently rounded at bend, its apical section being nearly parallel with inner wing-margin. Hind crossvein almost in middle between bend of fourth vein and small crossvein, and almost at right angle to fourth vein, nearly straight.

Reproductive habit, larviposition of slightly colored maggots probably near host.

Type-species.—*Ophirion mirabile* Townsend.

OPHIRION MIRABILE Townsend.

Ophirion mirabile TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 134 and 146.

Ophirion, sp. TOWNSEND, Proc. Ent. Soc. Wash., vol. 13, 1911, p. 161.—TD 3980.

Length of body, 4.75 to 5.5 mm.; of wing, 4.5 to 5.5 mm. Four females and three males, Piura, Peru, November 4, 1910, May 13, 1911, on bark of mesquite trunks and on window screens of house surrounded by these trees.

Pale brownish-yellow, thinly dusted with silvery pollen. Parafrontals faintly golden in both sexes, more distinctly so in male. Antennæ and palpi pale brownish-yellow, frontalia brownish. Mesoscutum of a darker ground color than rest of body, with same shade of pollen as parafrontals; a median pair of linear vittæ that become obsolescent posteriorly, and a heavier lateral vitta that is interrupted at suture. Scutellum, abdomen, femora, and tibiæ very pale brownish-yellow, the first two silvery dusted, tarsi dusky. Wings faintly infuscated on costal half, tegulæ whitish.

Type.—Cat. No. 15149, U.S.N.M. Female, November 4, 1910; TD 3980, *f. r. s., m., cph. sk.*

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Genus EUMYOBIA Townsend.

Eumyobia TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 146.

Allied to *Leskia* and *Pyrrhosia*, with following characters: Frontal bristles descending nearly to base of third antennal joint. Arista pubescent. Ocellar bristles very small but distinct. Second antennal joint not elongate, the third three times as long. Proboscis below geniculation longer than head-height, slender, horny, but labella conspicuous. Female with two orbital bristles, approximated to vertex. Three sternopleural and three postsutural bristles. Scutellum with only two marginal pairs of bristles, apical pair wanting, a short subdiscal pair present. No bristles on first abdominal segment except a very small lateral one; a long median marginal pair on second segment and a long lateral one; a marginal row of long bristles on third segment, being eight long ones, with six shorter ones on venter; a marginal row of shorter ones on anal segment, those below shorter than those above, all erect. Apical cell narrowly open, ending just before wingtip. Fourth vein continued in very short stump toward inner wing-margin, hind crossvein nearer to apical crossvein.

Reproductive habit, larviposition on or near host, the eggs and maggots being irregularly packed in the thick tubular twice-coiled uterus.

Type-species.—*Eumyobia flava* Townsend.

EUMYOBIA FLAVA Townsend.

Eumyobia flava TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 146–147.—TD 4021.

Length of body, about 10 mm.; of wing, 8 mm. One female, Sullana, valley of the Rio Chira, Peru, March 25, 1911, on foliage.

Whole face, cheeks, and lower half of occiput silvery-white, the parafrontals and upper portions of occiput with a deep but variable golden shade. Frontalia honey-yellowish, antennæ nearly same shade, the third joint dusky on apical half, the arista and its pubescence blackish. Palpi pale yellowish. Pleuræ silvery-white. Mesoscutum and scutellum deeply golden pollinose, the former with only faint indication of five vittæ. Abdomen straw-yellow with brown patches on second and third segments, that on third larger. Legs yellowish, tarsi brownish. Wings nearly clear, the costal margin yellowish, the veins accompanied by a faint infuscation.

Type.—Cat. No. 15150, U.S.N.M. TD 4021, *f. r. s.*

TROPIDOPSIS CONNECTANS, new species.

Length of body, 13 mm.; of wing, 13 mm. One male, Rio Charape, montaña of eastern slopes of Cordillera Oriental in the Province of

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Jaen, northern Peru, about 5,000 feet, September 12, 1911, on foliage.

Differs from Wiedemann's description of *T. pyrrhaspis* by having the mesoscutum deeply golden instead of sulphur-yellow, and the third abdominal segment wholly rust-yellow. The frontalia are brown. The entire fourth segment above and below is velvety-black. The hairs of the abdomen appear black on the third and fourth segments.

This is evidently the genus *Tropidopsis*. It does not belong to the Hystriciidæ, but is a member of the subfamily Pyrrhosiinæ of the Exoristidæ. This is indicated by its comparatively slight epistomal production on level with the vibrissal angles, the frontal bristles descending but little below base of antennæ, the structure of antennæ, the venation and the rather weak spinelike macrochætæ. The tarsi are much elongated, the metatarsi being over half the length of tibiæ. The genus closely approximates the tribe Saundersiini in general habitus.

Type.—Cat. No. 15151 U.S.N.M.

Probably deposits colored maggots, but not on foliage.

NEOTRAFOIA, new genus.

General characters of *Trafoia*, which form it apparently represents in the South American mountain regions. A pair of strong widely divergent ocellar bristles, long and slightly reclinate. Third antennal joint about three times as long as second, which is not elongate. Vibrissæ removed from oral margin, which is moderately prominent; three or four bristles above vibrissæ. Three pairs of strong decussate frontal bristles above antennæ, four or five pairs below. Two strong proclinate orbital bristles in female, no inner or upper orbitals. Outer vertical a little shorter than inner vertical bristles. Eyes thickly long-hairy. Cheeks less than one-half eye-height, female front about equal to eye-width, parafacials a little narrowed below, arista thickened on a little more than basal one-third. Proboscis short, palpi elongate and widened at tip.

Three sternopleural and three postsutural bristles. Two long lateral scutellar bristles, the posterior the longer; a slender elongate decussate apical pair, a single one on median line so close to apical pair as to be almost on apex of scutellum, just in front a widely separated pair of same strength, and in middle a single discal one on median line. There are thus two unpaired bristles on the median line. I have never noted such disposition of scutellar bristles in any other form. Abdomen very bristly, no median bristles on first segment, median discal and stronger median marginal pair on second segment, a lateral discal and two lateral marginal on second segment, median discal and lateral discal on third segment with marginal row

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of eight strong ones, anal segment with discal and marginal rows. Thorax, abdomen, and scutellum metallic bluish or greenish-black. Claws of female about as long as last tarsal joint, hind and especially middle tibiæ strongly spinose. Anal cell widely open, ending conspicuously yet but little before wingtip, wrinkle and very slight stump marking fourth vein beyond the bowed-in apical crossvein, hind crossvein nearer to apical crossvein.

Reproductive habit, larviposition probably of colored maggots, but not on foliage.

Type-species.—*Neotrafoia incarum*, new species.

NEOTRAFOIA INCARUM, new species.

Length of body, 7.5 mm; of wing, 6 mm. One female, Cuzco, Peru, February 21, 1910, on foliage.

Face, cheek-grooves, and orbits dull golden pollinose. Occiput and bristly portion of cheeks ashy. Parafrontals, frontalia, and antennæ dark brown, the first showing faintly pollinose in some lights, the third antennal joint broadly reddish-yellow on base. Palpi pale reddish-yellow. Pleuræ, mesoscutum, and scutellum thinly and faintly silvery-white pollinose, the usual four or five vittæ very indistinct. Abdomen silvery-white pollinose, showing most deeply white on narrow bases of second, third, and fourth segments, but extending thinly over practically whole surface as seen in oblique view. Legs black. Wings clear. Tegulæ white to pellucid, according to lights.

Type.—Cat. No. 15152, U.S.N.M.

EUGYMNOCHÆTA, new genus.

This genus is proposed for *Gymnochaeta alcedo* H. Loew. It bears only a superficial resemblance to the Palearctic *Gymnochaeta*. The third antennal joint is of ordinary form, not more broadened than distal end of the elongated second joint. The second aristal joint is not elongate. Oral margin is prominent, distinctly produced. The antennæ are inserted on eye-middle. Cheeks are one-fourth to one-third eye-height. Frontal bristles descend to insertion of arista. The genus probably belongs in the subfamily Pyrrhosiinæ.

Reproductive habit, larviposition of colored maggots but not on foliage.

Type-species.—*Gymnochaeta alcedo* H. Loew.

EUGYMNOCHAETA EQUATORIALIS, new species.

Gymnochaeta, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 133–134 Proc. Ent. Soc. Wash., vol. 13, 1911, p. 161.—TD 3973.

Length of body, 9 to 12 mm.; of wing, 8 to 11 mm. Three males and one female, Piura, Peru, October 28 to November 1, 1910, on

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flowers of species of *Mikania;* the female taken by Mrs. Charles H. T. Townsend.

Metallic bright green to bluish-green, the thorax and abdomen very thinly pollinose with silvery visible only in oblique view. Occiput and parafrontals green, with thin pollinose covering. Facial plate, parafacials, cheeks, and orbits pale golden pollinose, without green. Antennæ and palpi wholly brownish-yellow, arista brown. Frontalia brown. Third antennal joint two to two and one-fourth times as long as second in male, about two and one-half times as long as second in female. No median macrochætæ on first abdominal segment, but a median discal pair on second and third in both sexes and one median marginal pair on second segment. A small strongly decussate apical pair of scutellar bristles, and three strong lateral pairs, also a shorter discal pair. Three sternopleural and three postsutural bristles.

Type.—Cat. No. 15153, U.S.N.M. Female, November 1, 1910; TD 3973, *m.*, *cph. sk.*

Subfamily PHANIINÆ.

EUCELATORIA AUSTRALIS Townsend.

Eucelatoria, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 130 and 328.—TD 3906.

Eucelatoria australis TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 140 and 328; Proc. Ent. Soc. Wash., vol. 13, 1911, p. 163.

Length of body, 6 to 7 mm.; of wing, 5 to 5.5 mm. The male smaller than female. Various females and one male, Piura, Peru, June 19, 1910, to April 5, 1911, on foliage; one female (TD 3906) taken by Mrs. C. H. T. Townsend.

Head silvery-cinereous pollinose, the parafrontals faintly golden in female and the facial plate with a less distinct golden shade; the parafrontals and cheeks of male are more distinctly golden. Frontalia and antennæ wholly dark brown. Palpi reddish-yellow. Thorax and abdomen silvery-cinereous, the pollen of mesoscutum, scutellum, and anal segment of female more or less distinctly golden. All the pollen of abdomen in male has the golden shade, but that of second and third segments of female and sometimes of scutellum practically lacks it. The usual five vittæ on mesoscutum; three sternopleural and three postsutural bristles. Scutellum with three pairs of strong marginal bristles, the weak apical pair entirely absent, the weak discal pair present. Male with one median marginal pair of weak bristles on first abdominal segment, two weak discal median pairs on second and a strong median marginal pair, a weaker discal median pair on third segment with weak discal lateral and a marginal row of ten strong bristles, the anal segment with a marginal row and straggling weak discal ones. The female has the discal bristles of first three segments and the marginal ones of first two segments less developed but present;

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they are sometimes appressed to the surface and are almost indistinguishable from the bristly hairs of abdomen. Normally all the abdominal macrochætæ are erect. The marginal bristles of third segment in female consist of one strong median pair and two lateral ones on each side. The first segment and broad hind margin of second and third segments of female are black; segments two and three of male more narrowly black on hind margin; anal segment in male tipped with reddish-yellow, in female more broadly so. Piercer, ventral carina and spinulæ practically same as in *Dexodes*. Legs blackish, femora faintly pollinose, claws of male elongate. Wings clear, tegulæ whitish.

Type.—Cat. No. 15154, U.S.N.M. Female, April 5, 1911; TD 4025, *f. r. s., piercer and larvipositor*.

Cotype, female, June 22, 1910; TD 3906, *m., cph. sk*.

Deposits maggots subcutaneously in host.

DEXODES MERIDIONALIS, new species.

Length of body, 7 mm.; of wing, 5.5 mm. One female, Piura, Peru, July 17, 1910, on foliage.

This form is quite typical of the genus *Dexodes*, having the elongate second antennal joint, the bare facialia save for about three bristles next vibrissæ, and the eyes thinly and faintly hairy. The description is from the single female specimen.

Head silvery cinereous, the parafrontals and cheeks with a faint golden tinge. Frontalia brown, antennæ wholly dark brown. Palpi reddish-yellow. Ocellar bristles atrophied, represented by two delicate hairs.

Three sternopleural and three postsutural bristles. Pleuræ silvery-cinereous, mesoscutum and scutellum with the same faintly golden pollen as front, the usual five vittæ on former. Scutellum with three lateral pairs of strong bristles, a weak decussate apical pair, and a weak discal pair. Abdomen blackish, the second to fourth segments silvery pollinose on irregular anterior half extending on venter. First segment with a short median marginal pair of bristles; second segment with a short discal and longer marginal median pair; third segment with a stronger discal pair and a marginal row of eight strong bristles; anal segment with a discal median and a discal lateral pair besides the marginal row; all the macrochætæ erect. The piercer, ventral carina, and spinulæ of latter characteristic of *Dexodes*. Wings clear, tegulæ whitish.

Type.—Cat. No. 15155, U.S.N.M. TD 3930, *m*.

Deposits maggots subcutaneously in host.

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INCAMYIA, new genus.

General characters of *Dexodes*, with the strongly elongate second antennal joint, and the frontal bristles descending low; but eyes hairy, facialia strongly ciliate about one-half way up, and ventral carina of female very pronounced and occupying second and third segments. Vibrissæ on level with the slightly prominent oral margin. Female front about one and one-half times the width of one eye, the face but slightly wider. Female with one proclinate and two divergent orbitals in line, and one reclinate orbital inside these. Pair of weak proclinate divergent ocellar bristles. Third antennal joint of female about one and one-half times as long as second. Arista abruptly thickened on less than basal one-third. Proboscis short, palpi slender.

Three sternopleural bristles, three posteutural bristles. Three lateral pairs of scutellar bristles, the two posterior pairs equal and very strong, the anterior pair little more than one-half as long; apical absent; two very weak discal pairs, the anterior pair closely approximated, the posterior pair separated. All segments except first with pair of median discal bristles, first and second with median marginal pair, third with marginal row of eight, anal with lateral discal bristles and marginal row; lateral marginal ones on first and second segments. Terminal segments with base of piercer and larvipositor deeply sunk within anal or fourth (actually fifth) segment, the piercer strongly thrust into the deep carina of third (actually fourth) segment, only latter having the short spines for holding skin of host. Claws of female nearly as long as last tarsal joint, hind tibiæ irregularly bristly. Anal cell closed in margin well before wingtip. Fourth vein rounded at bend, hind cross vein nearer bend. Strong costal spine.

Reproductive habit, subcutaneous larviposition; uterus slender, developing white maggots.

Type-species.—*Incamyia cuzcensis*, new species.

INCAMYIA CUZCENSIS, new species.

Length of body, 5.5 mm.; of wing, 4.5 mm. One female, Cuzco, Peru, February 21, 1910, on foliage.

Black, with brassy pollen. Parafacials and parafrontals golden-brassy, vertex and orbits same, facial plate and facialia blackish with a faint silvery bloom, frontalia and antennæ dark brown, palpi pale brownish-yellow, cheek-grooves reddish-brown, cheeks narrowly brassy above, occiput ashy. Sternopleuræ brassy; mesoscutum thickly pollinose with pale brassy, leaving two heavy wide black vittæ which extend more or less distinctly on sides of scutellum, rest of latter brassy pollinose. Abdomen with golden-brassy pollen on second and third segments reaching on sides and in middle nearly to

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hind margin, leaving a shining black triangle on each side of median line; fourth segment with posterior margin shining black, the rest thickly golden-brassy pollinose extending on underside; carina and venter on each side ashy. Legs black. Wings faintly yellowish on broad costal portion, the color following the veins. Tegulæ white, with some yellowish shading on borders.

Type.—Cat. No. 15156 U.S.N.M.

SPATHIMYIA, new genus.

The description of this remarkable genus is made from a single female specimen. Eyes thinly hairy. Front about equal to width of one eye, face slightly and evenly widened from front. Parafacials much narrowed, bare. Cheeks a little over one-fifth eye-height, hardly one-fourth. Oral margin moderately prominent, vibrissæ about on level with median part of same. Facialia with four or five bristles not reaching lowest frontal bristles, which descend to insertion of arista. Second antennal joint of ordinary length, the third about three times as long as second or slightly more. Arista rather long, thickened on nearly basal one-third, basal joints short. Two outer proclinate anterior orbital bristles, and two inner reclinate posterior ones in line with frontals. Ocellar bristles present, slender but moderately long. Palpi nearly as long as the fleshy proboscis beyond geniculation, widened apically.

Three sternopleural and three postsutural bristles. Scutellum with two lateral pairs of moderately long curved bristles, a discal pair of weak ones, and an apical nondecussate pair of long straight ones reaching to base of anal abdominal segment. Abdomen with erect marginal and discal macrochætæ, the first segment with a median marginal pair, the other segments with discal as well as marginal, the median marginal pair of third segment much stronger than the marginal bristles on each side of them, the anal segment with a marginal row of equal bristles. Piercer of extraordinary development, about equal to the abdomen in length, gently curved, narrow, the edges strongly turned up on basal portion forming a deeply grooved dorsal aspect, in which lies the chitinized larvipositor extending fully two-fifths the length of the piercer. Ventral carina distinct but not especially salient, entirely devoid of the usual strong spinulæ of the Compsilurine flies and furnished only with weak bristly hairs. Apical cell narrowly open a little before wing tip, the bend of fourth vein normal and without stump or wrinkle, hind cross vein sinuate and nearer to bend of fourth than to small cross vein. Middle and hind tibiæ with three strong divergent bristles on middle, and three shorter apical ones.

Reproductive habit, subcutaneous larviposition, evidently in caterpillars whose skin is furnished with long hairs or spines. The absence

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of the spinulæ from ventral carina of female indicates that the carina does not come into contact with skin of host during larviposition. Moreover the female abdomen is laterally compressed and the ventral carina is very salient and wedge-shaped, the ventral surface of the abdomen being thus especially adapted to turn aside the long spines of the host without injury to itself therefrom.

Type-species.—Spathimyia ferox, new species.

SPATHIMYIA FEROX, new species.

Length of body, 7 mm.; of wing, 6 mm.; of piercer, fully 3 mm., which is same as length of abdomen. One female, in the montaña of the Rio Charape on the eastern slopes of the Cordillera Oriental, Province of Jaen, in northern Peru, about 5,000 feet, September 13, 1911, on foliage,

Parafrontals, parafacials, cheeks, orbits, and vertical triangle faintly brassy-cinereous pollinose, the facial plate including facialia hardly at all brassy. Occiput ashy, with whitish pile. Frontalia dark brown or black, nearly equilateral, equaling the median width of one parafrontal. Antennæ brown, the third joint faintly grayish in some lights. Palpi reddish-yellow. Pleuræ, mesoscutum, scutellum, and abdomen silvery-cinereous pollinose, with a more or less distinct brassy shade; the mesoscutum with two very wide velvet-black vittæ uninterrupted at suture, scutellum blackish on base and disk; tergum of first abdominal segment, a more or less distinct median line, and posterior half of second, third, and fourth segments black. Piercer polished black, larvipositor of a soft scarcely shining black. Legs black, the femora faintly pollinose beneath. Claws moderately short. Wings with a narrow smoky-yellowish infuscation along costa. Tegulæ whitish, with a yellowish tinge on borders.

This fly represents an extreme specialization in the Compsilurine group, far exceeding any form hitherto known in the development of piercer and likewise of larvipositor. In token of its extremely developed piercer, I have given it the generic name of sword-fly.

Type.—Cat. No. 15157 U.S.N.M.

PSEUDOMYOTHYRIA PERPLEXA Townsend.

Pseudomyothyria perplexa TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 148.—TD 4001, 4035.

Length of body, 3.75 to 4 mm.; of wing, 3 to 3.25 mm. Two males and one female, Somate, in the Rio Chira Valley, Peru, November 18, 1910, on flowers of species of *Telanthera*; and one female, Piura, Peru, April 17, 1911, on foliage.

Black, cinereous pollinose. Frontalia and antennæ blackish. Palpi brownish-yellow, darker basally. A very faint brassy shade to the pollen of parafrontals and parafacials, also to that of dorsal parts

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of body. Scutellum with two moderately strong lateral bristles, a long and straight subapical pair, between the last a slightly decussate and very weak apical pair. Both sexes with a very short median discal pair of bristles on second and third abdominal segments, a median marginal very short pair on first segment, a stronger median marginal pair on second segment, and a submarginal row of strong ones on third and fourth segments, the anal segment being without discal bristles. Legs black, claws very short and practically equal in both sexes. Wings clear, tegulæ whitish.

Type.—Cat. No. 15158, U.S.N.M. Female, Piura, April 17, 1911; TD 4035, *f. r. s.*

This form is typical of the present genus, the facialia being ciliate about half way up, parafacials much narrowed below, male front much narrower than that of female, eyes bare, apical cell closed and ending distinctly before wingtip.

Deposits white maggots, probably on host.

Subfamily ERYCIINÆ.

CHÆTOSISYROPS, new genus.

General characters of *Sisyropa*, but much more bristly and general form broad and robust. Eyes of female densely long-hairy, almost equidistant in front view above and below but slightly wider apart below, descending fully to level of vibrissæ; vertex about width of one eye or slightly more, frontal bristles long and descending nearly half way to vibrissal angles (more than two-fifths of the way); two proclinate orbital, and three reclinate orbital bristles but slightly inside them, the middle one of latter weaker; a pair of long outwardly proclinate ocellar bristles, nearly as long as orbital but much weaker. Facial plate wide and deeply set, vibrissæ on level with oral margin, latter cut off and not at all produced, vibrissal angles widely separated, facialia bristly about one-third way up, parafacials narrowed below to less than one-half the greatest width of parafrontals. Second antennal joint slightly elongate; the third heavily developed and wide, three to four times as long as second, usually reaching almost exactly to oral margin. Arista very long, thickened on about basal one-third. Parafrontals hairy, parafacials bare; cheeks fully one-eighth of eye-height; proboscis short and fleshy, with very large labella; palpi elongate, much swollen apically and a little flattened, bristly below.

Only two sternopleural bristles, four postsutural bristles. Three strong lateral scutellar pairs, one long but weak suberect decussate apical pair, one discal pair nearly same length and strength as apical. Scutellum quite thickly covered with erect rather long bristly hairs. Abdomen short-oval; one strong median marginal pair of macrochætæ on first and second segments, and a submarginal row of eight strong erect ones on third segment above with others below; shorter erect

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discal macrochætæ thickly placed with erect bristles on second, third, and anal segments, the anal thickly hairy and bristly. Claws of female elongate but hardly as long as last tarsal joint; hind tibiæ subciliate, with one heavy bristle near middle about twice as long as cilia; middle tibiæ with an immense bristle on outer surface near middle, being about one-half as long as tibia. Wings rather large, anal cell widely open well before wingtip, fourth vein bent at rounded angle, no wrinkle or stump at bend, hind cross vein nearer bend.

Reproductive habit, larviposition on or as near host as fly can approach; uterus coiled, developing white maggots.

Type-species.—*Chætosisyrops montanus*, new species.

CHÆTOSISYROPS MONTANUS, new species.

Length of body, 10 mm.; of wing, 9 mm. Four females, Matucana, Peru, west slope of Cordillera Occidental, about 7,800 feet, April 4, 1910, on flowers of *Cyclanthera*, sp.

Black, with head and thorax faintly silvery. Head black, occiput ashy except the tergite of sixth segment, face and front thinly silvery-white frosted, the facial plate brownish-yellowish in ground color in middle below, palpi same brownish-yellow color, frontalia and antennæ dark brown. Thorax very thinly and faintly pollinose, the four vittæ delicate and indistinct. Scutellum brick-yellowish. Abdomen soft deep brown, neither shining nor pollinose above, faintly silvery on middle of venter. Legs black. Wings smoky on baso-costal portion. Tegulæ deeply smoky.

Type.—Cat. No. 15159, U.S.N.M. TD 3929, *e.*, *m.*, *cph. sk.*

SIPHOSTURMIA POLLINOSA, new species.

Siphosturmia, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 135.—TD 4002.

Length of body, 7 to 8 mm.; of wing, 5.5 to 6 mm. Numerous females, Somate, valley of the Rio Chira, in the coast strip of northern Peru, November 18, 1910, on flowers of *Telanthera*, sp.

Head silvery-white pollinose, the front and upper part of occiput with a brassy-cinereous tinge. First two joints of antennæ reddish-yellow, third joint and arista black. Palpi reddish-yellow. Pleuræ silvery-cinereous; mesoscutum, scutellum, and abdomen with the same brassy-cinereous pollen as front. The usual five vittæ on mesoscutum; scutellum with three lateral pairs of marginal macrochætæ, a slender decussate apical pair, and a widely separated discal pair. First abdominal segment wholly blackish above, slightly pollinose below; second and third segments with black posterior border; posterior half of anal segment reddish-yellow; no median bristles on first segment, a median marginal pair on second, a lateral marginal on first and second,

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a marginal row on third, discal row on anal segment behind which are apical bristles and hairs. Legs blackish, the tibiæ faintly tinged with reddish-brown, the front femora pollinose on outer surface. Wings clear, tegulæ whitish.

Type.—Cat. No. 15160, U.S.N.M. TD 4002, *f. r. s.*

Deposits white maggots, probably on host.

Genus AZYGOBOTHRIA Townsend.

Azygobothria TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 142.

General approximation to external characters of *Sturmia*. Eyes quite thickly clothed with short hairs, which however, are inconspicuous and easily overlooked. Front of female at vertex hardly width of one eye, at antennæ greater than eye-width; face of female occupies three-sevenths of head-width below. Facialia ciliate nearly to lowest frontal bristles. Female with two proclinate and two reclinate orbital bristles on each side. A strong proclinate pair of ocellar bristles. Second antennal joint short, third in female four times as long as second. Arista long, thickened on basal half, basal joints inconspicuous. Cheeks hairy and about one-fourth eye-height. Face gently receding, front not prominent, epistoma subprominent, proboscis short and fleshy, palpi elongate and club-shaped. Vibrissæ almost on level with oral margin.

Four sternopleural bristles, the anterior and posterior strongest, the two middle ones situated a little lower. Four postsutural bristles, not counting a fifth one posteriorly a little outside the line of the others. Scutellum with three strong pairs of lateral bristles, a weak apical pair (not decussate in the single specimen showing them), and a stronger widely separated discal pair. Female with no median bristles on first segment, a median marginal pair on second, about ten strong marginal ones on third, weaker ones on anal. Hind tibiæ of female quite strongly ciliate, with a noticeably longer bristle near middle. Claws of female quite long, about same length as last tarsal joint. Apical cell open, ending well before wingtip. No stump or wrinkle at bend of fourth vein, hind crossvein nearer bend and normal in character. The genus is evidently allied to Achætoneura.

Reproductive habit, larviposition; uterus short strap-like, developing white maggots.

Type-species.—*Azygobothria aurea* Townsend.

AZYGOBOTHRIA AUREA Townsend.

Azygobothria aurea TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 142.

Length of body, about 9 mm.; of wing, 6 mm. Two females, Sullana, Peru, March 25, 1911, on foliage in valley of Rio Chira.

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Head wholly deep golden pollinose, the occiput with a slightly ashy tinge, tergite of sixth segment shining, frontalia and antennæ wholly dark brown, palpi pale brownish-yellowish. Pleuræ cinereous. Mesoscutum light golden pollinose; the five vittæ obscured in direct view, the disk of thorax appearing mostly black, but quite well defined in oblique view, the outer ones heaviest. Scutellum yellowish on apical half, golden pollinose over all. Abdomen with anterior half of second to fourth segments deeply golden pollinose, the golden rather widened in middle and on sides. Hind borders of the segments shining dark brown. Venter mostly ashy. Legs black, tibiæ faintly brownish. Wings clear, tegulæ whitish.

Type.—Cat. No. 15161, U.S.N.M. TD 4020.

Genus ZYGOSTURMIA Townsend.

Zygosturmia TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 142.

With the characters of *Zygobothria*, except that the parafacials are perfectly bare, the facialia bare save for two or three bristles immediately next vibrissæ, and other points to be gleaned from the description of type species, including a distinct facies.

Reproductive habit, larviposition of uncolored maggots on or near host.

Type-species.—*Zygosturmia inca* Townsend.

ZYGOSTURMIA INCA Townsend.

Zygosturmia inca TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 142.—TD 4031.

Length of body, 7 mm.; of wing, 5 mm. Two females, Sullana, Peru, valley of Rio Chira, April 11 and 12, 1911, on foliage.

Face and cheeks wholly silvery, parafrontals faintly to deeply brassy pollinose. Frontalia and antennæ dark brown. Palpi dark brown, brassy on tips. Occiput ashy. Pleuræ, mesoscutum and scutellum silvery pollinose, the pollen of last two with a faint brassy tinge. Two inner posteriorly abbreviated thoracic vittæ, an outer one interrupted at suture. Scutellum slightly yellowish on apex. Abdomen blackish, the second and third segments silvery pollinose except median line and rather narrow hind margin of each; anal segment reddish-yellow, silvery on about basal one-half. Legs blackish. Wings clear, tegulæ whitish.

Type.—Cat. No. 15162, U.S.N.M. TD 4031, *f. r. s.*

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Family HYSTRICIIDÆ.

Subfamily ERNESTIINÆ.

ECUADORANA, new genus.

Runs into section *Erigone* in Brauer and Bergenstamm's tables, and is evidently most allied therewith. Body short, broadened, especially in female. Front tarsal joints of female widened and flattened. Macrochætæ bristlelike, discal and marginal, female with none on first two abdominal segments, or only a very atrophied median marginal pair on second. Male with a discal and marginal pair on intermediate segments. Oral margin produced noselike, vibrissæ inserted far above same. Second antennal joint elongate, third longer than second. Cheeks about five-sixths of eye-height in female, two-thirds same in male. Front of male very narrowed behind, at vertex one-half the width of that in female. Frontal bristles descending to base of third antennal joint. Eyes thickly hairy. Ocellar bristles very weak, but distinct in both sexes. Male without, female with two orbital bristles. Proboscis rather short and fleshy. Palpi well developed, elongate, moderately slender. Three postsutural and three sternopleural bristles. Long apical pair of straight nondecussate scutellar bristles, three lateral pairs, and a shorter discal pair. Apical crossvein strongly bowed in, forming nearly right angle with fourth vein, latter in female continued in very short stump, apical cell well open a little before tip of wing. Hind crossvein nearer apical crossvein. Claws of male elongate.

Reproductive habit, probably leaf-larviposition of colored maggots.

Type-species.—*Ecuadorana bicolor*, new species.

The genus is named in honor of the Republic of Ecuador.

ECUADORANA BICOLOR, new species.

Length of body, 8 to 9 mm.; of wing, 7 to 8 mm. The females are the larger. One female and three males, Manchi, below Utuana, in the Cordillera Occidental of southern Ecuador, about 7,500 feet, November 22 to 26, 1910, on flowers of *Baccharis floribunda*.

Palpi yellowish; cheeks, parafacials, and facial plate silvery-cinereous pollinose; frontalia brown; parafrontals blackish to lower limit of frontal bristles, where they abruptly give way to the silvery, but in very oblique view they appear also silvery pollinose. First and second antennal joints reddish-yellow, the third joint and arista blackish. Thorax and scutellum brown, very thinly pollinose. Abdomen yellowish-red; the median one-third of first segment in female blackish, median one-half or more blackish in male; broad median blackish patch on segments two to four, quite rectangular in male, irregular in female. Venter and hypopygium wholly yel-

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lowish-red. Wings faintly infuscated, veins blackish with more or less definite linear smoky borders. Small crossvein narrowly black-clouded.

Type.—Cat. No. 15163, U.S.N.M. Female, November 22, 1910.

DOLICHOSTOMA, new genus.

Sarcophaga-like in facies of abdomen, but with the head characters of *Andinomyia* described farther on. Head extremely long, truncate-subconical, the parafacials almost as wide as eye-width. Eyes thickly hairy. Cheeks fully twice as long as mean width, greatly widened posteriorly, mean width rather less than eye-height. Female vertex about one and one-third times width of one eye, pair of proclinate-divergent ocellar bristles, two proclinate and two divergent orbitals in line in female. Frontal bristles descending low at widely divergent angle, outer short row of shorter bristles on parafrontals. Structure of facial plate, epistoma, vibrissæ, peristomal bristles, facialia and their bristles, antennæ, and arista quite same as in *Andinomyia*, except that the second antennal joint is not quite so elongate, arista is shorter with first and second joints both elongate, and lower or oral profile of head is almost straight. Third antennal joint rounded apically, slightly longer than second. Proboscis is awl-like, slender and horny, part below geniculation about as long as oral profile of head; palpi very long and slender, very gradually and slightly enlarged apically.

Three sternopleural and three postsutural macrochætæ; three lateral pairs of scutellar macrochætæ, the two posterior ones equal and very strong and the anterior one much shorter; very short weak apical pair, and a stronger longer widely separated discal pair, with a short pair between them. Abdomen flattened, submarmorate, no median bristles on first two segments, eight or ten weak marginal bristles on third segment and one or two lateral discal ones; several discal or submarginal and terminal ones on anal segment. Hind tibiæ with irregular bristles, claws of female nearly or quite as long as last tarsal joint. Apical cell very narrowly open well before wingtip, fourth vein prolonged in strong stump beyond apical crossvein, hind crossvein quite close to apical crossvein.

Reproductive habit, almost certainly leaf-larviposition; uterus probably strap-like, developing colored maggots.

Type-species.—*Dolichostoma alpina*, new species.

DOLICHOSTOMA ALPINA, new species.

Length of body, 9 mm.; of wing, 7.5 mm. One female, Tirapata, Peru, on the high puna of the Lake Titicaca region, about 13,000 feet, January 28, 1910, on flowers of a dwarf species of *Hypochæris*.

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Head cinereous pollinose, the parafrontals with a dusky shade, the parafacials more silvery, the cheek-grooves brownish-red, the frontalia brown; the entire facial plate pale brownish-yellow, thinly silvery pollinose. The frontalia show pollen in oblique view. Palpi brownish-yellow, faintly reddish. First two antennal joints reddish-yellow, third joint and arista dark brown. Occiput with brassy-gray pile. Thorax blackish, thinly silvery pollinose, with a heavy median black vitta extending to a point half way between suture and scutellum; on each side a narrower vitta interrupted at suture. Scutellum blackish, reddish on margin, thinly silvery pollinose. Abdomen blackish above except broad lateral and apical margins, which are brownish-yellow and thickly golden pollinose, the blackish portion silvery pollinose. Legs blackish or dark brown, the tibiæ reddish. Wings faintly yellowish on base, this color following the principal veins. Tegulæ whitish, narrowly margined with yellowish.

Type.—Cat. No. 15164, U.S.N.M.

ERIGONOPSIS, new genus.

Characters of *Dolichostoma* except: Head much shortened, the parafacials hardly more than one-half eye-width. Mean width of cheeks about two-thirds eye-height. Three proclinate and one divergent orbital bristles in line in female. Male antennæ practically same as female, third joint being but little longer than second, vertex of male about two-thirds eye-width, male without any orbital bristles, mean width of cheeks about one-half of eye-height. Claws of male fully one-third longer than last tarsal joint. Proboscis below geniculation rather less than height of head, strongly laterally compressed; palpi slender, filiform, and short, one-half as long as in *Dolichostoma*. Abdominal macrochætæ stronger. Apical cell open to almost closed; the hind crossvein sometimes extremely close to apical crossvein, the distance not exceeding length of small cross vein.

Reproductive habit, leaf-larviposition; uterus straplike, with colored maggots.

Type-species.—*Erigonopsis arequipæ*, new species.

ERIGONOPSIS AREQUIPÆ, new species.

Length of body, 9.5 mm.; of wing, 6.5 mm. Six females and one male, Arequipa, Peru, January 25, 1910, on flowers of composites.

Parafrontals and parafacials deeply to faintly golden pollinose, those of male deeply silvery with golden reflections. Facial plate yellowish, silvery pollinose. Frontalia brown. First two antennal joints reddish-yellow, third joint and arista blackish. Palpi pale yellowish, smaller in the single male than in any of the females. Cheeks and occiput cinereous, the latter with light to deep golden pile. Pleuræ, mesoscutum and scutellum thinly silvery pollinose, pollen of mesoscutum with a faint golden tinge and leaving three black

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vittæ, the median one broadest; apex of scutellum yellowish. Disk of abdomen blackish, shining, thinly silvery, the lateral edges and anal segment yellowish and golden pollinose; venter blackish and thinly silvery. In the male the small fifth or hypopygial abdominal segment is reddish-yellow. Legs brown, tibiæ slightly reddish. Wings nearly clear, the long veins yellowish. Tegulæ nearly white.

Type.—Cat. No. 15165, U.S.N.M. Female; TD 4059.

VIBRISSOMYIA, new genus.

General characters of the Micropalpine flies. Eyes bare, female vertex fully one and one-half times width of one eye, of male about eye-width. Face rapidly broadening from front. Cheeks about equal to eye-height in both sexes, clothed with sparse bristly hairs which extend on parafacials and parafrontals. Facial plate having rather a swollen or inflated appearance, feebly carinate above, the epistoma projected straight forward in a wedge-shaped production fully equaling length of second antennal joint. Vibrissæ barely distinguishable from the strongly vibrissiform peristomal bristles below them, being only slightly longer; facialia ciliate as far as ptilinal suture with shorter vibrissiform bristles usually three or four in number, these meeting both suture and peristomalia (peristomal row) almost at right angles, the facialia being abruptly bent inward below. Male with two pairs (exceptionally with an adventitious third pair) of reclinate orbitals next to frontalia, and two divergent pairs outside these; female with same and three proclinate orbitals in line with the two divergent ones. Inner vertical bristle long and decussate; outer vertical bristle nearly same strength but not quite so long, strongly divergent. A pair of divergent proclinate long ocellar bristles. Frontal bristles descending below base of antennæ at a widely divergent angle. A second nearly straight row of weaker frontal bristles outside, connecting ends of the inner bent row. Parafacials in both sexes as wide as or wider than length of second antennal joint, with a row of two to five strong facio-orbital macrochætæ with weak bristles more or less interspersed. Second antennal joint elongate; the third in female about same length as second, moderately widened and obliquely truncate at end; in male the third joint is considerably longer than second joint, greatly widened and obliquely truncate apically (not in *Vibrissomyia bicolor*). Arista stout, bare, subgeniculate, apical one-third slender, second joint long. Proboscis awl-like, very long, slender, and horny, part below geniculation longer than either height or length of head. Palpi absent.

Three strong sternopleural bristles; three postsutural bristles, sometimes a weak fourth. Two strong lateral scutellar pairs, two weak lateral pairs, one weak decussate apical pair, one weak discal pair. No median bristles on first abdominal segment, a median marginal

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pair on second, third with eight strong marginal; anal with submarginal and terminal shorter bristles thickly interspersed with erect bristly hairs especially in male. Male hypopygium greatly developed, often strongly exserted. Claws of female long, about as long as last tarsal joint; those of male nearly twice as long, longest on front feet. Hind tibiæ with irregular bristles. Legs strongly spined, especially middle tibiæ. Apical cell open far before wingtip, fourth vein with wrinkle at end, hind crossvein nearer to apical crossvein.

Reproductive habit, leaf-larviposition; strap like uterus, developing colored maggots almost certainly.

Type-species.—*Vibrissomyia lineata*, new species.

VIBRISSOMYIA LINEATA, new species.

Length of body, 9.5 to 13 mm.; of wing, 7.5 to 10.5 mm. Three females and nine males, Tirapata, Peru, high puna of the Lake Titicaca region, about 13,000 feet, January 28, 1910, on flowers of dwarf species of *Hypochæris*,.

Parafrontals very dark, shining blackish, thinly silvery pollinose, the pollen showing thickly in some lights. Entire face and cheeks luteous, silvery-white pollinose except the produced portion of clypeus and peristoma. Frontalia reddish-brown, first two antennal joints yellowish-red, third joint and arista dark brown, proboscis shining black or dark brown. Occiput ashy, with pale golden to grayish pile. Pleuræ and mesoscutum only very faintly silvery pollinose, latter with four faint vittæ of the usual pattern. Scutellum wholly pale yellowish-brown. Abdomen shining brown to blackish, with a distinct median line of pollen in both sexes; the first three segments of male more or less reddish, sometimes broadly rust-yellow or reddish-ocher, but in most males only faintly lighter on sides of second segment or wholly blackish. Legs black, claws black, pulvilli fuscous. Wings very faintly infuscated throughout, almost clear, the veins yellowish. Tegulæ whitish to watery, often with a smoky tinge, especially on front scale.

Type.—Cat. No. 15166 U.S.N.M. Female.

VIBRISSOMYIA BICOLOR, new species.

Length of body, 12 to 13 mm.; of wing, 9.5 to 10 mm. Two males with preceding species.

Differs from *V. lineata* as follows: Pile of occiput faintly to deeply golden. No median pollinose line on abdomen. First, second, and third abdominal segments entirely yellowish-red excepting only a broad median vitta of black above, and a vitta of black below bordering ventral plates. Tegulæ deeply fuscous throughout.

Type.—Cat. No. 15167 U.S.N.M.

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ANDINOMYIA, new genus.

General characters of Micropalpine flies and very similar in most characters to *Vibrissomyia*, but head much elongated anteriorly. Parafacials quite as wide as long, or nearly as wide as eye; cheeks quite as wide as eye-height, nearly twice as long as mean width, greatly widened and somewhat inflated posteriorly. Peristomal bristles conspicuously shorter than vibrissæ, only two or three bristles on facialia. Second antennal joint strongly elongate, longer than third even in male. Lower outline of the wedge-shaped production of epistoma in profile more sharply bent from the line of oral profile. Proboscis very long and slender, extremely awl-like, below geniculation conspicuously longer than greatest head-length. Otherwise in all head characters as in *Vibrissomyia*.

Three sternopleural and three postsutural bristles. Three lateral pairs of scutellar bristles, the two posterior very strong and equal, the anterior much weaker and not over half as long; pair of decussate apical bristles a little longer than anterior lateral. Abdomen with same disposition of macrochætæ as in *Vibrissomyia*, but the bristles not so strong and the erect bristly hairs of anal segment not present. Leg and wing characters the same as for *Vibrissomyia*, but hind crossvein more deeply bulged out, legs a little more strongly spined.

Reproductive habit, leaf-larviposition; uterus strap like, developing colored maggots in all probability.

Type-species.—*Andinomyia cruciata*, new species.

ANDINOMYIA CRUCIATA, new species.

Length of body, 10 to 12 mm.; of wing, 8 to 9 mm. Three females and five males, Tirapata, high puna region of Lake Titicaca, Peru, about 13,000 feet, January 28, 1910, on flowers of dwarf species of *Hypochæris*.

Head in both sexes luteous and densely light golden pollinose, the facial plate without pollen on produced portions, the parafrontals blackish with pollen distinctly showing. In a direct view the parafacials are abruptly defined, without apparent pollen, of same deep luteous color as the produced epistoma and peristoma. Frontalia brownish. Third antennal joint and arista dark brown or blackish, the first antennal joint reddish, second joint brown or blackish, with apex more or less reddish. Pile of occiput golden to pale brassy. Pleuræ very thinly dusted with brassy pollen, mesoscutum more distinctly so leaving the four usual vittæ; scutellum broadly reddish on margin to wholly reddish-yellow, usually the latter. Abdomen shining blackish, a faint brassy pollinose median vitta, and anterior border of anal segment with same brassy pollen; female with the sides of first two abdominal segments reddish, in male extending on the third

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segment. Legs black. Wings faintly and evenly infuscated, base and veins yellowish. Tegulæ watery-fuscous.

Type.—Cat. No. 15168 U.S.N.M. Female.

EPALPODES, new genus.

General characters of *Andinomyia*, differing as follows: Head much shorter, parafacials about two-thirds eye-width. Mean width of cheeks about two-thirds eye-height. Second and third antennal joints in male about equal, the third not enlarged and widened apically. Lower profile of the wedgelike epistomal projection nearly in line with the lower border of head, only slightly bent at most. Proboscis much shorter, part below geniculation less than head-height, palpi microscopic and bristle-tipped.

Three sternopleural, four postsutural bristles. Practically only two lateral pairs of scutellar bristles, the anterior or third pair being represented by weak bristly hairs; a weak lateral submarginal bristle between the two strong lateral ones. Abdomen much approaching *Epalpus*, but the macrochætæ still of the Micropalpine type; second and third segments each with two median discal pairs and a marginal row, the second segment sometimes with three median discal pairs, the third segment sometimes with only one such pair; first segment without any median; anal segment in male slightly emarginate, with discal row and marginal and submarginal macrochætæ. Hind and especially middle tibiæ strongly spined, male claws very strong and elongate. Fourth vein with spot at bend rather than wrinkle, hind crossvein hardly bulged.

Reproductive habit, leaf-larviposition; uterus strap-like, with colored maggots in all probability.

Type-species.—*Epalpodes equatorialis*, new species.

This genus may prove to belong to the Hystriciinæ, in the neighborhood of the Laundersiine group.

EPALPODES EQUATORIALIS, new species.

Length of body, 9 to 10 mm.; of wing, 8 to 9 mm. Five males, Manchi to Colaisaca, Cordillera Occidental of southern Ecuador, about 7,500 to 8,500 feet, November 22 and 23, 1910, on flowers of *Baccharis floribunda*.

Parafacials and cheeks very pale golden pollinose, appearing almost silvery in some lights. Parafrontals dusky, thinly brassy pollinose. Frontalia and first two antennal joints brownish-yellow, third joint and arista dark brown. Facial plate pale yellowish, with a faint silvery to yellowish bloom. Occiput ashy, with grayish-golden pile. Pleuræ thinly brassy pollinose. Mesoscutum brassy-cinereous, with five very faint dusky vittæ, the outer ones interrupted at suture, the next stopping a little behind suture. Scutellum wholly reddish-

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yellow. The abdomen bears a complete median vitta of the same golden-silvery pollen as that of face and cheeks, crossed by a broad fascia of the same pollen occupying slightly more than anterior one-half of fourth segment, and leaving two brown areas on posterior half of same. The broad median disk of first segment is brown, as is also a broad area bordering the median vitta on second segment and a more or less well defined area bordering vitta on third segment; the rest of abdomen is deep yellowish-red, extending broadly on venter. Hypopygium yellowish-red. Legs brown, tibiæ reddish. Wings evenly and lightly infuscated, the long veins yellowish, the crossveins blackish.

Type.—Cat. No. 15169, U.S.N.M.

ARCHYTAS INCASANA, new species.

Archytas, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 132.—TD 3989.

Length of body, 12 to 13 mm.; of wing, 9 to 10 mm. Numerous specimens of both sexes, Piura, Peru, at nearly all times of year, on flowers of *Spilanthes*, sp., *Mikania*, sp., and others, and on foliage. Most numerous in November. The males run a little smaller than females.

Head silvery-white, the parafrontals in female of a distinct golden shade, those of male usually silvery-cinereous but sometimes slightly golden. Occiput silvery, the pile yellowish-gray to golden. Palpi light reddish-yellow, first two antennal joints and base of third nearly same shade or slightly darker, rest of third joint and all of arista dark brown. Frontalia pale honey-yellowish. Pleuræ faintly brassy on the dense cinereous pollen; mesoscutum of female deeply golden pollinose, that of male less so and often silvery without brassy shade, the usual four very faint vittæ, scutellum wholly pollinose. Abdomen shining metallic bluish-black, the last segment wholly silvery-white pollinose in male, with a faint tinge of brassy in female, but appearing blackish in oblique view. Scutellum with two strong and two shorter marginal bristles, a weak decussate apical pair, and an erect short stout pair immediately in front of last, also discal short bristles; of the marginal ones the basal one is shortest. Legs wholly blackish. Wings clear, brownish-yellow on costo-basal area, the color mostly following the long veins. Tegulæ white.

Type.—Cat. No. 15170, U.S.N.M. Female, November 8, 1910; TD 3989, *f. r. s.*

Cotype, female, June 19, 1910; TD 3908, *m., cph. sk.*

Deposits colored maggots on foliage.

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Subfamily HYSTRICIINÆ.

ŒSTROHYSTRICIA, new genus.

Allied with *Epalpodes*, *Andinomyia*, and *Vibrissomyia*, from all of which it may be at once differentiated by the much broadened abdomen and densely placed spinelike macrochætæ of abdomen and scutellum. The description is drawn from a single female. Front broad and produced, at vertex rather more than width of one eye, broadening rapidly to face. Parafacials but little longer than wide, thickly beset with fine long hairs, these continued on parafrontals. Cheeks greatly widened and lengthened, as wide as eye-height and about one and one-half times as long as same, thinly set with bristly hairs. Peristomal bristles nearly same strength as vibrissæ, slightly shorter, about same as the two bristles which occur above vibrissæ, all directed same as latter. Epistoma extremely produced anteriorly beyond the peristomalia, the profile of upper half of facial plate being almost parallel with plane of occiput, the lower half of facial plate directed anteriorly downward from upper half at an angle of about 45°. Vibrissal angles not narrowing the facial plate. Second antennal joint elongated, third joint a little shorter than second and wider. Arista rather short, bare; basal joints short but distinct, hardly longer than wide. Frontal bristles slender, descending obliquely not quite as low as base of third antennal joint. Two slender proclinate orbital bristles, a pair of long delicate hairlike ocellar bristles. Eyes bare. Proboscis elongate and horny, part beyond geniculation hardly equal to head-height; palpi very small and short, vestigial.

Three sternopleural bristles, four very weak and hairlike postsutural bristles. A median pair of spinelike macrochætæ close to hind margin of mesoscutum. Scutellum with two pairs of strong lateral bristles, four heavy suberect spinelike marginal macrochætæ between them, two shorter submarginal median ones, and several still shorter erect ones on disk. Scutellum is very widened and shortened, nearly three times as wide as long, transversely subequilateral but bulged in middle. Abdominal macrochætæ are as follows: First segment with no dorsal, 5 or 6 lateral in a bunch, and a median ventral patch formed of about 18 in a widely open V-shaped double row. Second segment with 8 or 9 lateral in patch; more than median one-third of dorsum of segment covered with short erect ones, and a marginal row of 8 or 10 (9, 5 being on one side and 4 on other, these being slightly separated by a median submarginal pair like the median posterior pair of mesoscutum) heavy erect ones; venter of segment with median patch of 12, 9 being in an open V-shaped single row. Third segment without discal, with a marginal row composed of long heavy ones interspersed with much shorter ones, a median submarginal short pair, outside of which are 2 widely separated heavy ones; venter of

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segment with a marginal row of shorter ones and a submarginal row of still shorter ones. Anal segment likewise without discal, with marginal and submarginal rows continued in short ones on venter. Apical cell open well before wingtip. Fourth vein bent at right angle, deeply bowed in beyond bend. Hind cross vein sinuate and nearer to bend of fourth than to small crossvein.

Reproductive habit, almost certainly leaf-larviposition of colored maggots.

Type-species.—*Œstrohystricia subalpina*, new species.

ŒSTROHYSTRICIA SUBALPINA, new species.

Length of body, about 12 mm.; of wing, 12 mm. One female, Watkins's camp in canyon of Rio San Gaban, montaña of southern Peru, about 11,500 feet, February 16, 1910, on flowers of a shrub.

General color yellow to brownish-yellow. Head yellow with slight brownish tinge, dusky on parafrontals, with faint silvery bloom over all, epistoma rather shining yellow and translucent. Peristomal region yellowish. Frontalia and first two antennal joints yellowish-red, third joint and arista blackish. Occiput ashy, with golden-gray pile. Pleuræ faintly silvery-cinereous, reddish above. Scutellum and lateral edges of mesoscutum reddish-brown; the middle of first abdominal segment, the spined median one-third of second segment, the hind margins of third and fourth segments and the femora practically same shade of reddish-brown. The disk of mesoscutum and disk of third and fourth abdominal segments dusky-olive, with faint brassy-cinereous bloom. Venter, lateral one-third on each side of first and second abdominal segments and lateral edge of third segment light yellow; tibiae and tarsi bright yellow. Claws and pulvilli moderately long. Wings smoky throughout, the basal-cell area and three crossveins clouded black, the extreme base and median costal area yellowish. Tegulæ blackish-infuscate.

Type.—Cat. No. 15171, U.S.N.M.

DEJEANIA ANDINA, new species.

Length of body, 13 to 14 mm.; of wing, 11.5 to 12 mm. Four females and four males, Ollachea, canyon of the Rio San Gaban on east slopes of Cordillera Oriental in montaña of southern Peru, about 9,500 feet, February 2, 1910, on flowers of an euphorbiaceous shrub.

Close to *brasiliensis* Robineau-Desvoidy and *armata* Wiedemann. Differs in having no yellow whatever on legs. Front, frontalia, mesoscutum, and scutellum all nearly same shade of color, being a brownish-yellow. First three segments of abdomen are clear tawny-yellow, except black spot in middle of first. Fourth segment shining black except front border on sides yellow. Whole of face and cheeks soft light tawny-yellow. Pleuræ grayish-yellow. Legs wholly yel-

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low, a rust-yellow tinge to the femora. Mesoscutum has an olive shade of ground color which shows through when greased and becomes brownish. The frontalia sometimes have a rust-yellow tinge, likewise scutellum is sometimes quite the shade of the abdominal yellow.

Type.—Cat. No. 15172, U.S.N.M. Female; TD 3937.

Deposits colored maggots on foliage.

EUDEJEANIA, new genus.

Characters of *Dejeania*, but abdomen broad and robust, that of female especially subquadrangular, nearly as wide behind as in middle, deeply emarginate, buttocks-like posteriorly; that of male broad if not emarginate, not narrowed or tapering anally. Claws of male only a little longer than those of female, and same characters of palpi and proboscis as in *Dejeania*. Very large forms, going up to 11,000 or 12,000 feet in the Peruvian Andes.

Reproductive habit, leaf-larviposition; uterus very long and strap-like, developing colored maggots.

Type-species.—*Eudejeania subalpina*, new species.

EUDEJEANIA SUBALPINA, new species.

Length of body, 18 to 18.5 mm.; same to end of abdominal spines, about 20 mm.; of wing, 18 to nearly 19 mm.; of palpi, 4.5 mm. Breadth of abdomen, 10.5 mm. Two males, Watkins's Camp, in the canyon of the Rio San Gaban, eastern slope of Cordillera Oriental, southern Peru, about 11,500 feet, February 16, 1910, on flowers of a shrub.

Face and cheeks smoky-fuscous, the facial plate with a thin bloom, the parafacials and cheeks thinly pale brassy pollinose. Parafrontals brownish, with an olive tinge due to the brassy pollen. Frontalia, antennæ and arista dark brown. Palpi deep soft black. Occiput cinereous, with pale brassy pile, fringed with black pile. Pleuræ reddish and very faintly and thinly silvery. Mesoscutum brownish on disk, with a faint silvery to cinereous bloom leaving the usual five vittæ, the median one indistinct; lateral and hind margins obscure brownish-yellowish, the scutellum same color or slightly more reddish and without bloom. Abdomen wholly light brownish-blood-red above and below, with no trace of bloom above, very faintly and thinly silvery on sides of venter. Femora of nearly same reddish as abdomen, tibiæ deep rust-yellow or reddish-yellow; tarsi deep yellow, the spurs and hairs with more or less of a reddish tinge. Claws not greatly elongate, black-tipped. Wings deeply smoky-fuscous throughout; tegulæ deep fuscous with darker margin. Longitudinal veins of wings reddish.

Type.—Cat. No. 15173, U.S.N.M.

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EUDEJEANIA NIGRA, new species.

Length of body, 15 to 16 mm.; same to end of abdominal spines, 18 to 19 mm.; of wing, 15.5 to 16 mm.; of palpi, 3.75 to 4.5 mm. Breadth of abdomen, 9 to 10 mm. Two females and one male, Matucana, Peru, on west slope of Cordillera Occidental, valley of Rio Rimac, about 7,800 feet, April 4, 1910, on flowers of *Cyclanthera*, sp.

Differs from *E. subalpina* as follows: Head luteous, only faintly fuscous on facial plate if at all, the pollen entirely golden, the beard or main occipital pile rather deep golden. Palpi rust-yellow. Entire thorax and abdomen soft deep black, practically without pollen, only the faintest traces showing on sides of venter and pleuræ. Legs nearly concolorous throughout, of a deep yellow with a rust tinge, the tibiæ a little clearer yellow, the femora slightly if at all darker. Tegulæ deep soft black, being same color as the body and the dense spinose macrochætæ, and much darker than wings. Longitudinal veins of wings distinctly yellow.

Type.—Cat. No. 15174, U.S.N.M. Female; TD 4061.

LASIOPALPUS SUBALPINUS, new species.

Length of body, 11 mm. not including the apical abdominal macrochætæ; of wing 12 mm. One female, Watkins's Camp in canyon of the Rio San Gaban, east slope of Cordillera Oriental in high montaña of southern Peru, about 11,500 feet, February 16, 1910, on flowers of a shrub.

Head fuscous, thinly clothed with silvery pollen, the cheeks pale yellowish-brown. Antennæ black, frontalia light brown. Palpi and their cilia deep black. Thorax, scutellum, and abdomen yellowish-red, the disk of mesoscutum dull olive. Femora nearly same yellowish-red as abdomen or a little lighter, tibiæ still lighter, tarsi bright yellow. The anterior tarsi are much widened and flattened (female). Wings deeply smoky throughout. The abdomen is emarginate posteriorly, bearing two thick bunches of spines.

Type.—Cat. No. 15175, U.S.N.M.

Deposits colored maggots on foliage.

Family MASICERATIDÆ.

Subfamily MASICERATINÆ.

Genus OPHIROSTURMIA Townsend.

Ophirosturmia TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 133, 145.

General characters of *Sturmia*, but hind tibiæ not ciliate and head rather of a Meigeniine cast. Eyes of female very indistinctly and sparsely short-hairy. Front of female at vertex about one and one-fourth times width of one eye, evenly widening forward and face

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widening in same proportion, face at lower angle of eyes about one and three-fourths times eye-width. Frontal bristles more or less decussate, female with two proclinate orbitals, and two reclinate ones inside them, strong pair of proclinate ocellar bristles. Parafacials wide, about one-half width of space between crests of facialia, the latter bristly from one-third to nearly one-half way up. Oral margin cut off but quite produced, the vibrissæ distinctly removed from it. Cheeks nearly one-fourth eye-height, eyes descending a little short of vibrissæ. Proboscis short and fleshy; palpi elongate, bowed, slightly thickened apically. Second antennal joint moderately short; the third in female elongate and narrow, giving a linear effect; arista long, bare, thickened on basal one-third.

Three sternopleural bristles, the middle one weaker and approximated to the anterior. Four postsutural bristles. Three strong lateral pairs of scutellar bristles, the posterior longest; a long but weak decussate apical pair, a slightly shorter weak discal pair. First segment without median macrochætæ; second with a median discal short pair and a median marginal long pair, sometimes an adventitious weak bristle or two between these two pairs; third segment with a discal short pair and a marginal row of eight strong ones, not counting others below; anal segment with a discal row of shorter ones and a marginal row. Hind tibiæ with a sparse row of short bristles, a longer one or two among them. Claws of female about as long as last tarsal joint, appearing moderately elongate. Wings moderately elongate; anal cell very narrowly to widely open, sometimes appearing almost closed, ending well before wingtip. No wrinkle or stump at bend of fourth vein, hind crossvein nearer to bend.

Reproductive habit, leaf-oviposition; uterus long and slender, with yellow honeycomb-reticulate microtype eggs.

Type-species.—Ophirosturmia cincta Townsend.

This genus bears some affinity with *Pseudatractocera*, but second antennal joint is not very elongate, third joint is about three or more times as long as second, facialia are ciliate on lower two-fifths, and discal bristles are present on intermediate abdominal segments. It bears a strong resemblance to *Siphosturmia* in coloration of abdomen, latter being fasciate black and white with yellowish-red anal segment.

OPHIROSTURMIA CINCTA Townsend.

Ophirosturmia cincta TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 133 and 145.—TD 4012.

Length of body, 7 to 9.5 mm.; of wing, 5.5 to 7.5 mm. Two females, Piura, Peru, February 18 and 19, 1911, both taken indoors.

Whole head gray-silvery, the parafrontals and vertex lightly golden, the occiput cinereous, tergite of sixth segment dark brown,

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frontalia brown. Antennæ reddish-yellow, the third joint mostly brownish except base. Arista brownish, sometimes lighter on base. Palpi pale reddish-yellow. Pleuræ thickly silvery-gray pollinose; mesoscutum and scutellum same with a faint golden shade, former with four delicate but distinct black vittæ, outer ones interrupted at suture. Abdomen with the second, third, and fourth segments thickly silvery with faint golden tinge, the hind margin for about one-third of width of each segment being shining brown. Reddish ground color of abdomen shows on sides. Pollen extends on venter. First abdominal segment brownish. Legs reddish-yellow to reddish-brown, tarsi dusky. Wings clear. Tegulæ white.

Type.—Cat. No. 15176, U.S.N.M. TD 4013, *f. r. s.*

Cotype, TD 4012, *ch.*

Genus OMMASICERA Townsend.

Ommasicera TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 145.

General external characters of *Carcelia*, but apical cell ending just a little before wingtip. Eyes thickly short-hairy. Facialia bare save a few bristles above vibrissæ, latter on level with oral margin which is cut off and only slightly prominent. Front of female in middle equal to width of one eye, front and face evenly but slightly widening below from vertex. Cheeks narrow, not over one-eighth eye-height, the eyes descending almost to vibrissæ. Female with two proclinate orbital bristles and two reclinate ones inside these, the hindmost one weaker. Pair of proclinate ocellar bristles which are weaker than the strong orbitals. Second antennal joint short, third in female about four times as long as second; arista long, practically bare, thickened on basal one-third, basal joints short. Proboscis short and fleshy, palpi elongate and slightly thickened apically.

Three or four sternopleural bristles, the middle one or two very weak. Four postsutural bristles, the posterior one much stronger than the others. Three lateral pairs of scutellar bristles, the middle one weaker; a very delicate suberect apical pair curved forward, a less delicate discal pair. First abdominal segment with a median marginal pair of short macrochætæ, second with short median discal and marginal pairs, third with short median discal pair and marginal row of eight long ones, anal segment with discal and marginal rows of moderately long ones. Claws of female quite short, hind tibiæ subpectinate with sparse short bristles among which is a long one near middle. Apical cell narrowly open a very little before actual wingtip; fourth vein bent roundedly at right angle, its last section deeply and evenly bowed in, no stump or wrinkle at bend; hind cross-vein nearer to bend of fourth.

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Reproductive habit, leaf-oviposition; uterus long and thick, with yellowish microtype eggs whose choria have a stretched-honeycomb reticulation.

Type-species.—*Ommasicera chætosa* Townsend.

OMMASICERA CHÆTOSA Townsend.

Ommasicera chætosa TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 145.—TD 4018.

Length of body, about 6 mm.; of wing, 5 mm. One female, Sullana, Peru, March 25, 1911, on foliage in valley of Rio Chira.

Parafrontals deeply golden pollinose; the parafacials, facial plate, cheeks, and greater part of orbits silvery pollinose, the vertex and upper orbits golden. Frontalia and antennæ dark brown. Palpi reddish-yellow. Occiput ashy, with grayish pile, faintly brassy on upper portions, the tergite of sixth segment dark brown. Pleuræ and outer side of front femora silvery. Mesoscutum densely brassy pollinose, leaving a median pair of very slender vittæ, the usual outer vitta which is interrupted at suture being represented by a subtriangular presutural spot and a broad posteriorly attenuate postsutural marking. Scutellum brassy pollinose, the extreme base dusky. Abdomen blackish, the second and third segments densely brassy pollinose leaving only irregular hind margin of black, anal segment wholly brassy pollinose. Venter cinereous. Legs blackish. Wings clear; tegulæ watery, front scale more distinctly whitish.

Type.—Cat. No. 15177, U.S.N.M. TD 4018, *f. r. s., ch.*

METOPIOPS, new genus.

General external characters of *Masicera* and *Sisyropa*, but with a wonderful approach to the peculiar sexual head-characters of *Metopia*.

Front and face in both sexes quite equilateral, in both nearly or quite one and one-half times eye-width. Whole of parafrontals and parafacials in male burnished silvery-white, those of female golden. Both sexes with two proclinate orbital bristles, and a row of three or four (usually four) reclinate ones inside them. Facialia strongly ciliate, reaching nearly to second antennal joint and even with lowest frontal bristles, sometimes above latter in male. Front not strongly or conically produced in profile as in *Metopia*, but produced only moderately into an obtuse angle, slightly less obtuse in male perhaps. Frontalia very narrow; nearly or quite covered in middle by the inward extension of the parafrontals in male, not at all so in female. Face receding, vibrissæ on level with the slightly produced oral margin, proboscis short and fleshy, palpi elongate and club-like. Eyes thinly hairy in both sexes.

Three sternopleural bristles, often a weak fourth one, in both sexes. Four postsutural bristles. Two strong pairs of lateral

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bristles on scutellum, one very weak pair between these, one weak decussate apical pair, one weak separated discal pair. The posterior one of the two strong lateral pairs reaches beyond base of third abdominal segment when well appressed. No true macrochætæ whatever on first abdominal segment even on sides, one short median marginal pair on second, with two lateral ones on each side, a row of ten marginal on third segment, and a marginal and discal row on fourth, the anal discal ones weaker in female. Hind tibiæ equally pectinate in both sexes, with a stronger hardly longer bristle or two near middle. Claws nearly equal in both sexes, fairly short. Venation typical, apical cell open and ending well before wing tip, fourth vein without stump or wrinkle at bend, hind cross vein nearer to bend of fourth.

Reproductive habit, leaf-oviposition; uterus short and thick, with black microtype eggs.

Type-species.—*Metopiops mirabilis*, new species.

METOPIOPS MIRABILIS, new species.

Length of body of female 6 mm., of male 7 mm.; wing of female 4.5 mm., of male 5 mm. Three females and two males. Piura and Chapairá, in valley of Rio Piura, Peru, June 19, 1910, to May 21, 1911, on foliage.

Parafrontals, parafacials, cheeks, and orbits of female deep golden pollinose throughout, sometimes the orbits nearly silvery; corresponding parts of male burnished silvery-white, but the orbits, vertex, and cheeks have a very faint golden tinge in some lights. Facial plate and facialia of male dull silvery, those of female ashy. Occiput ashy. Frontalia of female brown, not visible in male or only slightly so. Antennæ of male wholly blackish, the first two joints in female sometimes reddish. Palpi of female brownish-yellow, those of male reddish-brown or brownish. Thorax silvery pollinose, thinly so on mesoscutum, with a tinge of golden on pleuræ and sides and middle of mesoscutum in male, but only a faint suggestion of golden in female. The usual four vittæ on thorax, the two median vittæ narrow and distinct, the outer ones broad, broken, and obscure; a short, more or less distinct fifth vitta between the median pair behind. Scutellum pale brick-yellowish, thinly silvery. Second to fourth abdominal segments silvery pollinose, with a faint tinge of golden in female and a distinct golden shade in male, only the narrow hind borders of second and third segments brownish; first segment brown. Venter silvery, last segment faintly golden in female, distinctly so in male. Ground color of abdomen shows reddish on sides and venter in both sexes. Legs black, wings clear. Tegulæ whitish, faintly bordered with yellowish.

Type.—Cat. No. 15178, U.S.N.M. Female, Chapairá, May 21, 1911; TD 4056, *f. r. s.*

Cotype, female, June 19, 1910; TD 3919, *ch., m., cph. sk.*

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BLEPHARIPA POLITANA Townsend.

Blepharipa politana TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 132.—TD 3977.

Length of body, 9 to 10 mm.; of wing, 7 to 8 mm. Numerous females, Piura, Peru, June 19 to November 3, 1910, on foliage.

Whole front, face, cheeks, and orbits light golden pollinose, the occiput ashy pollinose, the frontalia brown. Third antennal joint and arista brown; first two antennal joints and palpi yellowish-brown. Thorax, scutellum, and abdomen thickly silvery-cinereous pollinose, the usual five vittæ on mesoscutum, and a dark median line on abdomen. First abdominal segment largely blackish, the hind borders of second and third segments dusky, the anal segment wholly golden pollinose like the head. The sides of abdomen show more or less distinctly reddish. The first abdominal segment is without median macrochætæ, and with at most very small lateral ones. Second segment has at most a very weak median marginal pair, sometimes hardly to be differentiated from the bristly hairs; it has a distinct lateral macrochæta. The third segment has a marginal row of 10 strong bristles. There are 4 sternopleural and 4 postsutural bristles. The ocellar bristles are very small but distinct. The scutellar bristles are 4 marginal pairs, the one next to the basal much shorter than the others, the apical pair not decussate, a short discal pair present.

Type.—Cat. No. 15179, U.S.N.M. Female, November 3, 1910; TD 3977, *f. r. s.*

Cotype, female, June 19, 1910; TD 3911, *ch., cph. sk.*

Deposits black microtype eggs on leaves; uterus long.

Genus BRACHYMASICERA Townsend.

Brachymasicera TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 133, 143.

General external characters of *Masicera* and *Sisyropa*. Eyes thinly hairy. Facialia ciliate less than half way up, but truly ciliate on more than lower one-third. Vibrissæ quite on level with oral margin, latter cut off and but very slightly produced. Second antennal joint short, proboscis short and fleshy, palpi elongate and club-shaped, third antennal joint four times as long in female as the short second. Front and face almost equilateral (female), the latter only perceptibly widened, about one and one-half times as wide as one eye. Female with two proclinate orbital bristles, and two reclinate ones inside these. Long proclinate pair of ocellar bristles. Arista thickened only on basal one-fourth.

Two sternopleural bristles, sometimes a very weak third one between them. Three postsutural bristles, not counting one behind which is outside the line of the others and does not properly belong with them. Three strong lateral pairs of scutellar bristles, the pos-

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terior pair especially long and nearly reaching base of third abdominal segment; a weak decussate apical pair, and a weak discal pair. A weak median marginal pair of macrochætæ on first abdominal segment, a strong median marginal pair on second, a marginal row on third and fourth. Hind tibiæ thinly pectinate, the bristles not flattened or cilia-like, with a longer bristle near the middle. Claws of female fairly long, about equal to last tarsal joint. Venation typical, the apical cell open and ending well before wingtip, the hind crossvein nearer bend of fourth, no wrinkle or stump at bend of latter.

Reproductive habit, leaf-oviposition; uterus shortened and thickened, with black microtype eggs.

Type-species.—*Brachymasicera polita* Townsend.

BRACHYMASICERA POLITA Townsend.

Brachymasicera polita TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 133, 143.—TD 3987.

Length of body, 8 mm.; of wing, 6 mm. One female, Piura, Peru, November 7, 1910, on flowers of species of *Mikania*.

Front, face, cheeks, orbits, and ocellar area deeply golden pollinose, the facial plate a little less distinctly so. Frontalia brown. Antennæ brown, first two joints and palpi reddish-yellow. Occiput densely ashy pollinose, the tergite of sixth segment conspicuously soft dark brown. Occipital pile gray, not very thick. Thorax, scutellum, and abdomen with pollen of a faint golden shade, most distinctly golden on sides of last three and especially last two segments of abdomen, nearly silvery on pleuræ, venter of first abdominal segment except narrow hind margin silvery-cinereous. Four vittæ on mesoscutum, the outer ones interrupted at suture. First abdominal segment above blackish, hind borders of second and third segments blackish in some lights. Legs dark brown. Wings clear, tegulæ whitish.

Type.—Cat. No. 15180, U.S.N.M. TD 3987, *e.*, *ch.*, *m.*

BRACHYMASICERA SUBPOLITA, new species.

Length of body, 7.5 mm.; of wing, 5.5 mm. One female, Piura, Peru, June 19, 1910, on foliage.

Differs from preceding species as follows: All of head except occiput silvery-white pollinose, only faint shade of brassy at vertex. Occiput ashy pollinose, with a brassy tinge, tergite of sixth segment dark brown. Palpi and first two antennal joints paler yellowish. Pollen of venter of first abdominal segment more nearly concolorous with rest, having a faint tinge of golden. Legs wholly yellowish-red to reddish-yellow, tarsi dusky.

Type.—Cat. No. 15181, U.S.N.M. TD 3907, *e.*, *cph. sk.*

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CHÆTOPHOROCERA, new genus.

General external characters of *Phorocera*, but more bristly throughout and all bristles heavy, long, and strongly developed; legs elongate.

Female front at vertex about two-thirds eye-width or slightly more, that of male about one-half eye-width. Male with two reclinate orbital bristles nearly in line with frontals; female with same and two proclinate ones outside them. Face strongly receding, front prominent in profile. Proboscis short and fleshy; palpi long, curved, much thickened apically, with long bristles below on basal part of thickening. Facialia ciliate usually to above lowest frontal bristle with long strong bristles, a row of fine hairs outside them. Parafrontals hairy. Eyes densely long-hairy. Facial plate broad, the vibrissæ nearly on level with the slightly prominent oral margin. Cheeks about two-fifths eye-height in both sexes. Face below as wide as both eyes in male, wider in female. Second antennal joint not elongate, third joint about four times in female and five times in male the length of second. Arista long, thickened on basal one-third, microscopically short-pubescent basally. Inner vertical bristle strong, like the orbitals.

Three sternopleural bristles; three postsutural bristles, very long. Three lateral pairs of scutellar macrochætæ, the posterior pair very long; one pair of long but weaker suberect apical decussate bristles, and one discal pair of same strength. Scutellum with erect moderately long bristly hairs. First abdominal segment with median marginal pair of macrochætæ, second with median discal and marginal pairs, third with median discal pair and marginal row of 16 or 18 extending below, anal segment with marginal and discal row. Hind tibiæ with row of sparse bristles, about three of them longer, a row of fine hairs among them. Female claws long and strong, those of male much longer and stronger. Tibiæ and femora moderately bristly. Apical cell open well before wing tip, hind crossvein sinuate and nearer to bend of fourth vein, usually no wrinkle or stump at bend.

Reproductive habit, leaf-oviposition; uterus with black microtype eggs whose choria show an arc-band pattern.

Type-species.—*Chætophorocera andina*, new species.

CHÆTOPHOROCERA ANDINA, new species.

Length of body, 10.5 to 11 mm.; of wing, 9.5 to 10 mm. Nine males and eight females, Matucana, Peru, west slope of Cordillera Occidental, about 7,800 feet, April 4, 1910, on flowers of *Cyclanthera*, sp.

Head wholly dusky-cinereous pollinose with a faint brassy shimmer, the occiput ashy. Ground color of head black, except the epistoma and cheek-grooves which show brownish to brownish-yel-

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low when the pollinose covering is destroyed. Frontalia and antennæ dark brown. Palpi pale reddish-yellow. Pleuræ thinly cinerous. Mesoscutum thinly silvery, with a median pair of narrow black vittæ and an outer vitta broken by suture, presutural portion of latter broader. Scutellum light brownish-red, blackish on base, thinly silvery. Abdomen soft dark brown, faintly silvery on bases of second and third segments, the silvery broadening on sides of segments, widely silvery on base of anal segment and on bases of ventral portions of other segments. The sides of abdomen are reddish in male. Legs black to dark brown, tibiæ reddish. Wings rather deeply yellowish-smoky in the costo-basal region of the long veins. Tegulæ whitish, yellowish on borders.

Type.—Cat. No. 15182, U.S.N.M. Female; TD 3928, *e.*, *ch.*

CHÆTOPHOROCERA FUSCOSA, new species.

Length of body, 9 mm.; of wing, 9 mm. One female, canyon of the Rio San Gaban at Uruhuasi bridge, February 3, 1910, on flowers of species of *Baccharis*.

Differs from preceding species as follows: General color darker. Scutellum entirely black. Abdomen dark brown to black, the anal segment wholly silvery pollinose, the third segment with only the faintest trace of pollen laterally on anterior margin. Legs black except the reddish tibiæ, wings more deeply smoky on costal third or more, and tegulæ distinctly smoky. Palpi reddish-yellow, or rust-yellow.

Type.—Cat. No. 15183, U.S.N.M. TD 3960.

Subfamily SALMACIINÆ.

Genus PHASIATACTA Townsend.

Phasiatacta TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 144, 329.

Female front three-sevenths, male front one-third of head-width. Female with one proclinate and two reclinate orbital bristles; male with one reclinate. Ocellar bristles strong, reclinate. Front with three rows of bristles on each side; parafacials with short bristles, more developed in male. Facial plate plus facialia fully as wide as the two parafacials. Oral margin abruptly and narrowly produced, vibrissæ well above same, few bristles above vibrissæ. Second antennal joint elongated in both sexes, the third slightly longer. Arista moderately short, bowed, thickened throughout; second joint elongate, two or three times as long as wide. Eyes bare. Proboscis stout but horny, part below geniculation equal to that above, entire length exceeding head-height. Palpi slender, strongly bowed at the slightly thickened ends. Cheeks same width as parafacials. Eyes descending nearly or quite to level of oral margin.

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Four sternopleural bristles, the posterior one much the strongest. Four postsutural bristles. Scutellum with three strong pairs of lateral bristles, and a very short pair of subapical bristles in male hardly stronger than rest of dorsal scutellar bristles. First abdominal segment of male with 1 lateral macrochæta, second with 2 lateral and 2 short median marginal, third with row of 10 marginal and still others below, fourth with 8 marginal counting those below. Female without dorsal bristles on first and second segments, with 1 lateral on each; third and fourth segments like male. Hind tibiæ ciliate, with a slightly longer cilia-like bristle in middle which is perhaps better developed in female as a rule. Claws of female about equal to her shortened last tarsal joint, of male a little longer than his elongate last tarsal joint. Apical cell open, ending well before wingtip. No wrinkle or stump at the abruptly rounded rectangular bend of fourth vein, hind crossvein a little nearer to bend of fourth than to small crossvein.

Reproductive habit, leaf-oviposition; uterus very long and slender, with black elongate microtype eggs somewhat pointed at ends, chorion not honeycomb-reticulate but with alveolæ surrounding a central opaque area.

Type-species.—*Phasiatacta elongata* Townsend.

PHASIATACTA ELONGATA Townsend.

Phasiatacta elongata TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, pp. 144, 329.—TD 4019.

Length of body, 9.5 mm.; of wing, 6.5 mm. One male and one female, the latter Sullana, Peru, March 25, 1911, on foliage in Rio Chira valley; the former Chapairá, in the Rio Piura valley, May 21, 1911, on foliage.

Face and cheeks silvery-white, the parafrontals deeply golden extending on occiput and upper orbits. First two antennal joints reddish-yellow or yellowish-red, third joint and arista dark brown. Palpi pale brownish-yellow. Occiput with grayish pile appearing faintly brassy above. Pleuræ and outside of anterior femora silvery pollinose; mesoscutum faintly brassy pollinose in female, decidedly brassy in male, leaving four heavy and practically equal black vittæ, the median pair appearing shorter when viewed from behind. Scutellum pale brownish-yellow. Abdomen of female reddish on sides, tip, and whole of venter; blackish on disk; covered with silvery pollen which has a faint brassy tinge on upper portion. Abdomen of male blackish nearly throughout, faintly reddish on sides of second segment, anal segment tipped with reddish, thickly brassy pollinose above in a submarmorate pattern, leaving median and lateral blackish areas irregularly defined on second and third segments; venter deeply silvery-white pollinose except on sides

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and narrow hind margins of second and third segments and sides of first segment. Legs dark brown. Wings clear, tegulæ whitish.

Type.—Cat. No. 15184, U.S.N.M. Female; TD 4019, *f. r. s., e., ch., m.*

Genus CNEPHALODOPSIS, new name.

Cnephalodes TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 145 [preoccupied].

Practically all the characters of *Phasiatacta*, excepting only as follows: Facialia ciliate more than half way up; facial plate plus facialia in male wider than, to about same width as, one parafacial, but parafacial wider than same in female. Third antennal joint longer, one and one-third to one and one-half times the elongate second joint in female, nearly to fully twice or more the shorter second joint in male. Mean frontal width of male equal to a little more than one-third the head-width, that of female nearly one-half same. Proboscis perhaps a little longer. Cheeks narrower than parafacials.

Three to five sternopleural bristles. First and second abdominal segments with 1 lateral macrochæta each; first with no median, second with a median marginal pair, third with 8 strong marginal and only short ones below, fourth with 8 to 10 strong marginal. Same in both sexes. Middle longer bristle of cilia of hind tibiæ pronounced, especially long in female. Claws about equal in both sexes, barely as long as last tarsal joint in both.

Reproductive habit same; uterus and eggs same in general character, but chorion markedly different in structure, honeycomb-reticulate.

Type-species.—*Cnephalodes* (= *Cnepholodopsis*) *pollinosus* Townsend.

CNEPHALODOPSIS POLLINOSA Townsend.

Cnephalodes pollinosus TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 145.—TD 4038.

Length of body, 10 to 12.5 mm.; of wing, 8 to 9 mm. The smaller measurement is of the male. Numerous specimens of both sexes, Piura, Peru, November 5, 1910, to April 21, 1911, on flowers of *Spilanthes*, sp., and on foliage.

Head silvery-white pollinose throughout, the vertex and facial plate pale yellowish. Frontalia brownish, but thickly dusted with a silvery pollen. First two antennal joints reddish-yellow, third joint and arista dark brown. Palpi yellow with a faint rusty tinge. Occiput with gray pile, the pollen of upper portions distinctly golden in male. Entire thorax, scutellum, and abdomen of female silvery-white pollinose, but rather thinly and irregularly distributed, producing a submarmorate appearance on abdomen. The pollen of male has a distinct brassy-cinereous tinge from vertex to tip of abdomen. By this slight difference in shade of pollen the two sexes, so closely similar in

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anatomical characters, can be distinguished at a glance with the naked eye. The sides of abdomen in male are very faintly reddish, this color only apparent on close inspection. The female has the second antennal joint longer in proportion than male. Legs blackish, the anterior femora and tibiæ pollinose on outside. Wings clear, faintly yellowish on extreme base; tegulæ white, usually faintly margined with yellowish in female but wholly white in male.

Type.—Cat. No. 15185, U.S.N.M. Female, April 21, 1911; TD 4038, *f. r. s.*

Cotype, female, April 21, 1911; TD 4040, *ch., m., cph. sk.*

SALMACIA PERUVIANA, new species.

Gonia, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 143–144; Proc. Ent. Soc. Wash., vol. 13, 1911, pp. 156–157.—TD 4011, 4037.

Length of body, 10 to 13 mm.; of wing, 7.5 to 9.5 mm. Numerous specimens of both sexes, Piura, Sullana, Lima, Ñaña (near Lima), and Arequipa, Peru, on flowers of *Spilanthes*, sp., *Flaveria contrayerba*, other composites, *Polygonum*, sp., and on foliage.

This form, whether species, variety, or race, whether it interbreeds with other forms here given or does not so interbreed, is distinguishable by the following characters and may best be referred to under the present name. The prevailing color of abdomen is luteous, the hind margin of third segment and the tip of anal segment are blackish, and there is usually a small median marginal blackish spot on second segment. Abdomen and especially thorax and head with pronounced brassy pollen. Front luteous, with the bristles rather sparsely set and usually distinguishable as arranged in not over four rows on each parafrontal, not counting the orbital bristles. Third antennal joint in female is yellowish on base, rest blackish; that of male is wholly black or blackish.

Type.—Cat. No. 15186, U.S.N.M. Female, Piura, February 2, 1911; TD 4011, *f. r. s.* (short uterus).

Cotype, female, Piura, April 21, 1911; TD 4037, *f. r. s.* (long uterus), *e., m.*

Deposits black microtype eggs on leaves.

SALMACIA PACIFICA, new species.

Practically same size as preceding. Five females, Ñaña and Arequipa, Peru; four males, Piura, Lima, and Ñaña, Peru. On same flowers as preceding.

Abdomen reddish to dark, sometimes nearly same as in preceding, but the pollen of abdomen and all other parts silvery, especially that of thorax. The sparsely bristly luteous front same as in preceding, and with not over four bristle rows on each parafrontal. Antennæ same as in preceding.

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Type.—Cat. No. 15187, U.S.N.M. Female, Ñaña, January 9, 1910; TD 4047 (long uterus).

Cotype, female, Arequipa, January 25, 1910; TD 4044 (long uterus), *m., cph. sk.*

Same reproductive habit.

SALMACIA CHÆTOSA, new species.

Same size as the others. Four females from Ñaña, on flowers of *Flaveria;* six males from Lima, Ñaña, Sullana, and Somate, Peru, on flowers of *Flaveria, Spilanthes, Polygonum,* and *Telanthera.*

Abdomen reddish to dark; pollen silvery, especially on thorax and head. Five bristle rows distinguishable on each parafrontal, the bristles being thickly set. The front is whitish in ground color rather than luteous, conspicuously silvery and especially noticeable as being thickly bristly. The abdomen is narrowed and pointed in male, being subconical, and often so in female. Antennæ same as in preceding.

Type.—Cat. No. 15188, U.S.N.M. Female, Ñaña, January 9, 1910; TD 4046 (short uterus with fully developed maggots), *e., m.*

Same reproductive habit.

SALMACIA ALPINA, new species.

Length of body, 7.5 mm.; of wing, 6 mm. One male, Tirapata, on the high puna of the Lake Titicaca region, Peru, about 13,000 feet, January 28, 1910, on flowers.

Abdomen wholly black, silvery-white pollen on anterior portion of segments. Thorax blackish or dusky, the pollen faint. Scutellum luteous. Front luteous, with only two bristle rows on each parafrontal. Face and front silvery-white pollinose, the pollen almost invisible on parafrontals except anteriorly. Third antennal joint and arista wholly deep black. Occiput blackish, ashy, vertical area luteous. Legs black. Wings yellowish on base and veins, tegulæ white.

Type.—Cat. No. 15189, U.S.N.M.

Same reproductive habit.

PROTOGONIA, new genus.

The description is drawn from a single male specimen. Differs from *Triachora* in the following characters: Second antennal joint not at all elongate. Second aristal joint strongly elongate. Parafacials beset with fine hairs. The inner row of frontal bristles is the main one, the two rows outside same being independent of the strong descending frontals. No orbital bristles in male. A strong pair of proclinate ocellar bristles. Scutellum with a pair of weak apical decussate bristles, a stronger widely separated pair of discal bristles,

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and three strong and long pairs of lateral bristles. First abdominal segment without median macrochætæ, second with a median marginal pair of short ones, third with a marginal row of ten or twelve counting those on venter, anal segment with several subapical bristles.

Differs from *Salmacia* in the head not being excessively swollen, in the proclinate ocellar bristles, and other characters as given. Differs from *Goniomima* in the long second aristal joint, the stouter arista, and other characters as given above.

Reproductive habit unknown, but almost certainly leaf-oviposition of microtype eggs.

Type-species.—*Protogonia ocellaris*, new species.

PROTOGONIA OCELLARIS, new species.

Length of body, 11 mm.; of wing, 9.5 mm. One male, Rio Suyo, western base of Cordillera Occidental, extreme northern Peru, about 1,500 feet, November 20, 1910.

Head silvery-white with a more or less distinct golden tinge below which becomes pronounced on parafrontals. Frontalia dark brown. First two antennal joints reddish-yellow, third joint and arista dark brown. Palpi light brownish-yellow. Occiput ashy, beard grayish-white. Pleuræ and mesoscutum silvery, five distinct vittæ. Scutellum reddish, base darker, thinly silvery over all. Abdomen reddish throughout, posterior portion of third segment brownish, an indistinct median vitta brownish, anal segment thickly light golden pollinose, other segments silvery-white pollinose appearing thinly or thickly so according to varying light, third segment more thickly so and with a tinge of golden to the pollen. All of venter silvery-white except the light golden anal segment. Legs brownish, tibiæ reddish, femora silvery. Wings clear, tegulæ white.

Type.—Cat. No. 15190, U.S.N.M.

TRIACHORA EQUINOCTIALIS, new species.

Length of body, 10 to 11 mm.; of wing, about 8 mm. Numerous specimens of both sexes, Piura, Peru, October 28 to November 8, 1910, and later, on flowers of species of *Mikania*.

This form has orbital bristles in both sexes, normally three proclinate and one reclinate. The male has the front not quite so wide, the claws and pulvilli more elongate, the second antennal joint only moderately elongate and the third joint strongly so, latter being three or four times length of second. The female has the second antennal joint more strongly elongate, the third joint being hardly more than twice length of second.

All of face and cheeks silvery-white pollinose, the facial plate being same as the other parts. Entire front pellucid brownish-golden, the

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parafrontals pollinose but showing pollen only in oblique view. Antennæ reddish-yellow, arista and third joint except base blackish or brown. Palpi pale brownish-yellow. Occiput ashy. Pleuræ silvery-cinereous, the mesoscutum less thickly so. Four sternopleural bristles, the end ones very strong, the intermediate ones weak; four postsutural bristles. Scutellum of the same leaden ground color as mesoscutum, brownish-yellow on margin, pollinose basally, with four strong marginal pairs of bristles, and a subapical erect nondecussate very short pair; discal pair weak and hardly distinguishable in some cases. First abdominal segment dark brown, second segment brown with the basal portion silvery-cinereous pollinose, the third segment thickly golden-yellow pollinose leaving the posterior margin brown, anal segment entirely densely deep golden pollinose. A weak pair of median marginal bristles on first abdominal segment in both sexes, a much stronger median marginal pair on second segment, marginal row on third and fourth segments. Legs blackish. Wings faintly infuscated throughout, more distinctly so on costal margin. Tegulæ whitish, faintly yellowish on margins.

Type.—Cat. No. 15191, U.S.N.M. Female. October 28, 1910; TD 3969, *e.*

Deposits black microtype eggs on foliage.

BELVOSIA PIURANA, new species.

Belvosia piurana TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 143.—TD 4032.

Length of body, 13 to 14 mm.; of wing, same measurement. Numerous males and females, Piura, Peru, October 30 and 31 and early part of November, 1910, on flowers of species of *Mikania*, and Sullana, in the valley of the Rio Chira, on flowers of *Philibertella flava*, an asclepiadaceous vine.

Black, the entire head white-silvery pollinose, only the occiput and parafrontals with dark ground color showing through the pollen, and frontalia reddish-brown in a direct view. Antennæ brown, the first two joints and base of third more or less distinctly reddish-yellow. Palpi reddish-yellow. Hair of occiput white. Thorax faintly silvery pollinose, the pollen only showing in oblique view. Scutellum pale reddish-brown. Abdomen black, the second segment very narrowly margined with silvery pollen anteriorly, the third segment more widely so, the fourth segment wholly silvery pollinose excepting only the spinose apex. Some individuals show a pale golden shade to the pollen, while in others it is pure silvery-white. Legs black. Wings smoky throughout.

Type.—Cat. No. 15192, U.S.N.M. Female, Sullana, April 12, 1911; TD 4032, *ch., m.*

Deposits black microtype eggs on foliage.

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Subfamily BLEPHARIPEZINÆ.

JÆNIMYIA, new genus.

The description of this interesting genus is made from the male only. No ocellar bristles. Hind tibiæ densely plumose without longer bristle. No macrochætæ on first two abdominal segments except short lateral ones and sometimes a very short inconspicuous atrophied median marginal pair on second. Third segment with a marginal row of short spinelike macrochætæ. Fourth segment without spinelike macrochætæ but thickly furnished with bristles and hairs. Scutellum with four pairs of strong marginal bristles, none decussate, the apical pair longest and widely separated. Disk of scutellum near posterior apical edge with a few very short stubby spinelike macrochætæ. The genus quite unmistakably belongs to the Blepharipezinæ, in the neighborhood of *Parachæta*, on the characters of macrochætæ, ciliate hind tibiæ, head, venation, etc.

Proboscis short and stout, palpi curved and thickened at tip. Vibrissal angles placed far above oral margin, distance being fully one-half length of the third antennal joint, or more than length of second antennal joint. Oral margin prominent but not nasute. Facialia bare. Front at vertex about equal to width of one eye. Cheeks rather more than one-half eye-height. One pair of strongly reclinate vertical bristles. Frontal bristles descending to base of third antennal joint. Second aristal joint about as long as wide. Four postsutural and two sternopleural bristles. Apical cell open just a little before wingtip. Bend of fourth vein rounded-rectangular, hind crossvein nearer bend. Claws and pulvilli only moderately elongate.

Reproductive habit, almost certainly leaf-oviposition of black microtype eggs.

Type-species.—Jænimyia albicincta, new species.

Named for the Province of Jaen, Department of Cajamarca, Peru.

JÆNIMYIA ALBICINCTA, new species.

Length of body, 12 to 13 mm.; of wing, 11 to 12 mm. Four males, Rio Charape, in the montaña of east slope of Cordillera Oriental, Province of Jaen in northern Peru, about 5,000 feet, September 12 to 16, 1911, on foliage and on damp soil by stream.

Face and cheeks wholly and densely silvery-white pollinose. Parafrontals black, silvery-white pollinose showing densely so on anterior two-thirds in some lights, less distinctly so at vertex. Frontalia, antennæ and palpi wholly dark brown or blackish. Occiput silvery, with silvery-white pile. Thorax and scutellum black, pleuræ faintly silvery; mesoscutum thinly silvery, with five black vittæ, median one nearly reaching scutellum, next one on each side

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stopping a third of way behind suture, the outer one interrupted at suture and attenuated posteriorly. Scutellum thinly silvery-white on posterior half, showing thickly so in some lights, the apex of metanotum below it also silvery-white pollinose. First abdominal segment wholly soft black above and below; second segment wholly densely silvery-white pollinose like face above and below, excepting only the very narrow hind margin of soft black which becomes attenuated laterally to continue again on venter; third segment black, with four large densely silvery-white pollinose spots reaching a little more than two-thirds of way to hind margin, the lateral spot on each side continued on venter in an arm of silvery-white on anterior margin broadening at end; anal segment black, with four very small silvery-white pollinose spots on anterior margin, the lateral ones not continued on venter. Femora and tibiæ blackish, except distal half of front tibiæ which is thickly golden short-hairy on the inside. Hind tarsi brownish, but with golden short thick hairs on inside; other tarsi yellowish. Wings wholly and evenly infuscated with deep tawny-blackish, only the costal cells lighter. Both pairs of tegulæ pearly-black throughout.

Type.—Cat. No. 15193, U.S.N.M.

JÆNIMYIA PUNCTATA, new species.

Length of body, 13 mm.; of wing, 12 mm. One male with preceding specimens, September 15, 1911. Differs from preceding species in following points: Face and cheeks densely buff-golden pollinose. Palpi light brownish-yellow. Parafrontals dusky-olive and brassy marmorate. Occiput ashy, with brassy-gray pile. Pollen of pleuræ, sternum and front coxæ more cinereous, hardly brassy. Scutellum wholly soft black; abdomen same, with four small silvery-white spots on front margin of second, third, and fourth segments, those of second segment smallest and those of third segment largest. The second and third segments show some silvery narrowly on anterior margin on venter, that of second segment wider. The middle and front tibiæ are brownish-yellow, also tips of front femora and inside of tips of middle ones; tarsi yellow to rust-yellow. The basal and costal cells of wing are lighter.

Type.—Cat. No. 15194, U.S.N.M.

BLEPHARIPEZA MONTAGNA, new species.

Length of body, 12 mm.; of wing, 11.5 mm. One female, Uruhuasi bridge, canyon of the Rio San Gaban, montaña of southern Peru, about 6,500 to 7,000 feet, February 15, 1910, on flowers of *Baccharis*, sp.

Head silvery-white pollinose, including facial plate and occiput. Parafrontals with blackish ground color which gives them a dark shade in some lights. Frontalia brown, antennæ dark brown. Palpi

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pale brownish-yellow, dusky basally. Beard silvery-white. Pleuræ and mesoscutum thinly silvery-white pollinose, showing thickly in some lights, the usual five vittæ distinct. Scutellum wholly brownish-red to reddish-brown, shining and without bloom. Abdomen of same reddish-brown as scutellum, varying to shining dark brown or blackish on disk. Legs brown, femora dark brown with silvery bloom. Wings clear, more or less deeply infuscated at base. Tegulæ deep smoky-blackish.

Type.—Cat. No. 15195, U.S.N.M. TD 3947, *e.*, *ch.*, *m.*, *cph. sk.* Deposits black microtype eggs on foliage.

Family PHASIOPTERYGIDÆ.

Subfamily PHASIOPTERYGINÆ.

PHASIOPTERYX AUSTRALIS Townsend.

Phasiopteryx australis TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 136–137 and 149–150.—TD 4005.

Length of body, 7.5 mm.; of wing, same measurement. Two females, Piura, Peru; one at light in house January 14, 1911, the other taken on window screen of house February 7, 1912.

Wholly pale straw-color, with black bristles, the third antennal joint and proboscis more deeply tinged, and the frontalia more deeply colored in one specimen. The thorax is very faintly tinged with flesh-color, more appreciable in perfectly fresh specimens. Disk of mesoscutum is grayish-dusky centrally, especially behind suture; four broken vittæ of deeper straw-color are faintly apparent, the median pair dividing the dusky area more or less clearly into three vittæ. The entire body is very thinly silvery pollinose, the bloom only visible on close inspection. The first abdominal segment has only lateral macrochætæ; second has lateral, and six very small almost atrophied marginal ones; third has marginal row of eight pronounced ones besides the lateral, which they equal in strength; anal segment has a discal row of about same strength, and a marginal row of weaker ones. Three equal pairs of marginal scutellar bristles, the apical pair decussate; a small separated discal pair. Two sternopleural and three postsutural bristles. A small round black spot is situated on front border of extreme wing-base, and the small crossvein of wing is narrowly clouded with black. The wing veins are pale yellowish, the marginal cell is deeply yellowish, and the costal cells are hardly less so. The apical cell is well open in both specimens. The third antennal joint is scarcely twice as long as second, and the arista is delicately thinly hairy. There are four outwardly-proclinate orbital bristles in a row on each side.

Type.—Cat. No. 15196, U.S.N.M. Female, January 14, 1911; TD 4005, *f. r. s.*

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A third female of this genus, taken indoors at Piura, December 15, 1911, measures only 6 mm. in length. The apical cell is absolutely closed, the tip of wing slightly more rounded, and the two costal cells wholly clear. The discal row of bristles of anal segment is practically wanting, and the small discal scutellar bristles are more approximated. There are three sternopleural bristles on one side, but the middle one of opposite side is atrophied. It remains to be seen whether this specimen represents a distinct form. These flies are so rarely met with that sufficiently large series for study do not yet exist in collections.

Deposits isopodiform maggots with dorsal and lateral chitinized segmental plates, which evidently have often to endure long exposure before reaching their hosts.

As throwing possible light on the host habit of this genus, it may be mentioned that *Trixa* has been reared in Europe from certain coprophagous scarabs. On external characters *Phasiopteryx*, *Oestrophasia*, and their immediate allies seem more or less nearly related to *Trixa*. A certain small coprophagous scarab allied to *Onthophagus* is common in Piura, where it feeds and breeds in dung of horses and burros, evidently burying dung-pellets with its eggs. It may be that the present species of *Phasiopteryx* is parasitic in its larva. The structure of the first-stage *Phasiopteryx* maggot seems very well adapted for attachment to the legs or ventral surface of the female scarab, awaiting the formation by latter of the dung-pellet which it afterwards rolls away for burial. The maggot may easily transfer its attachment from the scarab to the pellet during the rolling process. The maggot is evidently adapted, in a greater degree than is any other first-stage maggot so far known in the Muscoidea, not only for exposure in the open but also for external attachment to heavily chitinized surfaces during such exposure. Its hard highly chitinized and polished segmental plates afford it protection from air, light, and external contacts, while its soft unchitinized and sucker-like ventral surface affords it means of external attachment. The peculiar cephalic bunches of talon-like spines possessed by the first-stage maggot of *Phasiopteryx bilimeki* (TD 1791*a* from Vera Cruz) may well be a further special adaptation for external attachment. It is thus possible if not probable that the female *Phasiopteryx* deposits her maggots on or at the edge of fresh dung, where they would have excellent opportunities for attaching themselves to the arriving scarabs. The fecundity of *Phasiopteryx* is apparently very moderate, in the neighborhood of only 500 or 600, and this indicates a larviposition habit that would make reasonably sure of the maggot encountering the host.

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Unfortunately the character of the first-stage maggot of *Trixa* is unknown. It is possible that it is somewhat similar to that of *Phasiopteryx*.

Family DEXIIDÆ.

Subfamily DEXIINÆ.

MICROCHÆTINA ARIDA Townsend.

Almugmyia arida TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 136, 148; Proc. Ent. Soc. Wash., vol. 13, 1911, pp. 154-155.—TD 3979.

Length of body, 6 to 7 mm.; of wing, 5 to 6 mm. Numerous specimens of both sexes, Piura, Peru, August 9 to November 4 and later, 1910, on trunks of mesquite.

Wholly thickly cinereous pollinose, the face and front quite silvery. Frontalia and antennæ brown. Cheeks with a light brownish tinge. Thoracic vittæ very faint, hardly showing through the thick pollen. The pollen of hind borders of abdominal segments is faintly yellowish. The female lacks median macrochætæ on the first two abdominal segments or has at most atrophied ones, but the male has a median marginal pair on the second segment. Both sexes with the long median pair of third segment subdiscally placed. Anal segment with discal row. The wings are faintly straw-colored on base and costa. Costal spine strong. Apical cell long-petiolate. Male front greatly narrowed at vertex. Third antennal joint in both sexes about one and one-half times as long as second. Claws of male very long.

Type.—Cat. No. 15197, U.S.N.M. Female, November 4, 1910; TD 3979, *f. r. s.*

Deposits white maggots in choria where they can reach host.

This is the type of the genus *Almugmyia*, which I prefer for the present to leave in *Microchætina*. It may be employed, if found desirable, on comparison of the types of the two genera.

AGLUMMYIA, new genus.

This genus differs from *Almugmyia* by having the hind crossvein in middle between small crossvein and apical crossvein, the petiole of apical cell short, end of fourth vein not greatly removed from hind margin of wing, parafrontals and parafacials much narrower, the latter with fine hairs throughout, third abdominal segment with marginal row of macrochætæ. *Almugmyia* has apical cell with a very long petiole, the hind crossvein much approximated to small cross vein, the bend of the fourth vein far removed from hind margin of wing, the parafrontals and parafacials wide, the latter with a few short black bristles on lower extent near inferior eye-border, and third abdominal segment with only a median subdiscal pair of macrochætæ besides the lateral pairs. The other characters are very similar in the two genera. Three sternopleural and three postsutural

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bristles. Scutellum with two long marginal pairs of bristles, a shorter decussate apical pair and a discal pair equal to last.

Reproductive habit, larviposition of white maggots in choria where they can reach host.

Type-species.—Aglummyia percinerea, new species.

AGLUMMYIA PERCINERRA, new species.

Almugmyia major TOWNSEND, Proc. Ent. Soc. Wash., vol. 13, 1911, pp. 154–155 [*nomen nudum*].

Length of body, 6.5 to 7.5 mm.; of wing, 5.5 to 7.5 mm. Numerous females, Piura, Peru, October 18, 1910, to March 15, 1911. Taken only in house, on one occasion at light.

Deeply cinereous pollinose over whole body, a faint yellowish tinge to the pollen on front, mesoscutum, scutellum, and especially abdomen. Frontalia pale brownish. Antennæ brown, first two joints reddish-yellow. Arista and its short pubescence brown. Cheek-groves broadly reddish-brown, palpi reddish-yellow. First abdominal segment without median macrochætæ; second segment with a median pair a little removed from hind margin; third segment with a row of six or eight equally removed from hind margin; anal segment with a discal row of six or eight, and several apical bristles. All the segments have lateral marginal macrochætæ, and the third segment has also one or more lateral discal bristles. Femora distinctly brownish-yellow, the tibiæ less so, the tarsi quite dusky. Claws and pulvilli moderately long. Wings nearly clear, tegulæ whitish.

Type.—Cat. No. 15198, U.S.N.M. Female, November 8, 1910; TD 3991, *m., cph. sk.*

Cotype, female, October 18, 1910; TD 3959, *e.*

ŒSTROPSIS, new genus.

Body-facies of a *Calliphorine*, but head rather Œstrid to Dexiid in characters. The description is made from a single male specimen. Front produced, at vertex rather less than width of one eye, widening rapidly forward from posterior third to face. Frontalia greatly widened anteriorly. Eyes bare. Parafacials nearly as wide as long, appearing wider than front at vertex, beset with rather long bristly hairs, which extend on parafrontals. The parafrontals are very wide anteriorly, but greatly narrowed posteriorly. The single row of slender frontal bristles on each side stops about opposite base of antennæ. A pair of proclinate ocellar bristles equaling frontals in strength. Cheeks about as wide as eye-height, and including their occipital area longer than wide, bare save for the invading hairs of parafacials and those of the occipital area. The occipital area extends obliquely far forward on cheeks, reaching peristomalia at a point about as far forward as anterior margin of eye. Antennæ short, third joint but slightly longer than second. Arista of moderate

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length, crooked, practically bare with only faint indication of a microscopic pubescence, somewhat enlarged on basal one-fifth, thence tapering, basal joints short. Facial plate above vibrissæ broad-oval, lightly carinate, the vibrissal angles narrowing its lower portion and situated about as far above oral margin as length of second antennal joint. Vibrissæ twice as long as the peristomal bristles below them. Facialia bowed, bare save for a very few bristles next vibrissæ. Oral margin not prominent, cut off, the whole facial plate nearly vertical in profile. Proboscis short, but horny rather than fleshy, part below geniculation distinctly less than cheek-width. Palpi well developed, about as long as antennæ, hardly thickened apically.

Three sternopleural and four postsutural bristles. Scutellum with two long pairs of lateral bristles, a very slender apical decussate pair about half as long, and a discal pair of about same length as latter. First two abdominal segments with only a lateral marginal macrochæta, third segment with a marginal row of about 10 rather long bristles, anal with discal and marginal rather shorter ones. Legs long, with stout macrochætæ on the tibiæ; claws and pulvilli very long and strong. Wings without costal spine. Apical cell open well before wing-tip. Apical crossvein hardly bowed in, fourth vein continued in extremely short stump directed toward inner margin of wing and without wrinkle, hind crossvein gently sinuate and nearer to apical than to small crossvein.

Reproductive habit unknown, but judging from the head and wing characters it should be larviposition after the manner of Dexiids.

Type-species.—*Œstropsis viridis*, new species.

ŒSTROPSIS VIRIDIS, new species.

Length of body, 11.5 mm.; of wing, 10 mm. One male, Tamboraque, on the western slope of the Cordillera Occidental, valley of the Rio Rimac, Peru, about 9,000 feet, April 3, 1910, on flowers of *Cyclanthera*, sp.

Front, face and cheeks blackish, thickly covered with a changeable satin-like yellowish-silvery pollen, even the broad frontalia so covered, but the facial plate and facialia not pollinose. Occiput shining metallic greenish-purple, thinly dusted with silvery which does not obscure its ground color, considerably invading the cheek-area. First two joints of antennæ reddish-yellow, third joint and arista dark brown. Facialia and sides of facial plate brownish-yellowish, the carina and epistoma blackish. Palpi pale brownish-yellow, little darker apically. Pleuræ and mesoscutum metallic greenish-purple like the occiput, thinly silvery, appearing thickly so in some lights, four heavy velvet-black vittæ, the outer ones subinterrupted and wider. Scutellum metallic green, purplish on disk and base. Abdomen metallic bright green; the hind borders of first three segments

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with more or less of purplish reflection, the fourth segment with a rust-gold tinge in middle, all very thinly silvery pollinose but appearing very thickly so in oblique view. Legs brownish-yellowish to reddish, the femora more or less metallic purplish. Wings faintly infuscated with smoky-yellowish along the veins. Tegulæ smoky-whitish, deeply smoky on margins.

Type.— Cat. No. 15199, U.S.N.M.

Family SARCOPHAGIDÆ.

Subfamily SARCOPHAGINÆ.

SARCOPHAGA AURIBARBATA, new species.

Sarcophaga auribarbata TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 129–130, 139 [*nomen nudum*].

Length of body, 10.5 to 14 mm.; of wing, 8.75 to 11 mm. Numerous specimens of both sexes, Piura, Peru, indoors and on foliage.

Head of female wholly densely deep golden pollinose, even including whole of occiput, only excepting the frontalia dark brown, the facialia brownish and not pollinose or with only a faint silvery bloom, and the tergite of sixth segment, which is brown with silvery bloom, while the facial plate is less deeply golden and sometimes only faintly so. The head of male is sometimes, if not usually, less deeply golden. Antennæ and palpi dark brown to blackish. Occiput with more or less deeply golden pile, the beard most deeply golden in both sexes. Humeri deeply golden pollinose, the color running back along edge of mesoscutum to root of wing. Mesopleuræ with lighter golden or brassy pollen, rest of pleuræ silvery or cinereous pollinose. Three heavy black vittæ on mesoscutum, the median one extending over scutellum; rest of mesoscutum and scutellum silvery-white to silvery-cinereous pollinose. Abdomen marmorate with shining black or brown and silvery-white pollinose surfaces, the pollen thickest on sides and front half of segments, the anal or fifth segment of female reddish and deep golden pollinose, hypopygium of male reddish. Legs blackish, femora more or less pollinose outwardly. Wings clear, tegulæ white.

Type.—Cat. No. 15200, U.S.N.M. Female, November 2, 1910; TD 3975, *f. r. s.*

Cotype, female, June 19, 1910; TD 3900, *m., cph. sk.*

Deposits maggots from a double-sac uterus in proximity to food supply or host, being at times pseudoparasitic.

SARCOPHAGA AURIGENA, new species.

Sarcophaga aurigena TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 129–130, 139 [*nomen nudum*].

Length of body, 9.5 to 11 mm.; of wing, 7.5 to 9 mm. Numerous specimens of both sexes, Piura, Peru, indoors and on foliage.

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Differs from preceding species as follows: The golden pollen is confined to front of head, the whole occiput being ashy. Beard scanty and faintly brassy, occipital pile very little developed. Pollen of thorax and scutellum same shade as that of occiput, with only a suggestion of brassy on mesopleuræ and mesoscutum in female, that of male silvery. The thoracic vittæ are not so heavy, but they are broad and well defined. The abdominal pollen in male is distinctly brassy on fourth segment, less so on sides of third segment; the fourth segment in female is deeply golden pollinose like cheeks, third segment less so, second segment sometimes slightly so. The narrow hind margins of first to third segments and a well defined median vitta are black.

Type.—Cat. No. 15201, U.S.N.M. Female, March 29, 1911; TD 4024, *f. r. s.*

Same reproductive habit as preceding.

SARCOPHAGA ARGENTEA, new species.

Sarcophaga argentea TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, pp. 129–130, 139 [*nomen nudum*].

Length of body, about 10 mm.; of wing, 7.5 mm. One female, Piura, Peru, November 3, 1910.

Differs from *S. aurigena* as follows: Occiput, face, and cheeks nearly concolorous in a gray-cinereous pollen, with at most a faint suggestion of brassy on cheeks. Parafrontals lightly brassy. Thoracic vittæ still weaker and not so well defined, not black, rather brown to dark brown. Abdomen cinereous pollinose, with a faint tinge of brassy, especially on sides and fourth segment.

Type.—Cat. No. 15202, U.S.N.M. TD 3976, *f. r. s.*

Same reproductive habit as preceding.

SARCOPHAGULA PERUANA, new species.

Sarcophagula peruana TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 139 [*nomen nudum*].

Length of body, 3.75 to 4.75 mm.; of wing, 3 to 4 mm. Numerous females, Piura, Peru.

Face and cheeks silvery, occiput ashy, parafrontals silvery with a more or less distinct golden tinge. Frontalia brownish, pale anteriorly; antennæ pale brownish, palpi pale. Thorax and abdomen cinereous pollinose, mesoscutum with three very faint narrow dusky vittæ. Pollen of thorax is more or less silvery, that of abdomen more or less brassy, the latter with usual marmorations. Legs blackish. Wings clear, tegulæ white.

Type.—Cat. No. 15203, U.S.N.M. Female, November 9, 1910; TD 3990, *m.*

Same reproductive habit as preceding.

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EUPARAPHYTO, new genus.

Belongs in the Sarcophagidæ in the neighborhood of *Sarcophaga*, from which it differs in the practically bare arista, the strong bristles of parafacials, the facial and antennal structure, strong costal spine, etc. From *Paraphyto* it differs in the single row of frontal bristles, which descend below base of second antennal joint, the bristles of parafacials, etc. The description is drawn from a single female specimen.

Front elongate and broad, longer than facial plate, wider at vertex than one eye, a strong pair of ocellar bristles, two proclinate and one divergent-reclinate pairs of orbital bristles. Parafacials very broad, with about four strong bristles in a row near lower eye-margin; between these and frontal bristles are several weak hairs. Facial plate short, deeply bowed, the oral margin thus being prominent, the vibrissæ inserted practically on same. Facialia with a few short bristles next vibrissæ, latter a little longer than the peristomal bristles. Second antennal joint hardly elongate, third joint no longer than second; arista thickened on basal one-third, with only the faintest microscopic pubescence on thickened portion, basal joints short. Cheeks nearly two-thirds of eye-height, fully one-half same in least width, fully twice as long as wide, sparsely set with bristly hairs. Proboscis subhorny but stout, part beyond geniculation much less than head-height; palpi elongate, widened apically, a little shorter than proboscis beyond geniculation.

Three sternopleural and three postsutural bristles. Scutellum with four rather strong, long, nearly straight marginal bristles, the inner pair widely separated; the discal weak pair nearly atrophied, but distinct. Abdomen without dorsal bristles on first three segments, but second and third segments with one lateral marginal bristle, and first segment with several lateral bristles and a median ventral pair, the venter otherwise without bristles; fourth segment with a marginal row, becoming gradually hairlike on venter. Wings with a long and strong costal spine, the venation as in *Sarcophaga*, the apical cell very widely open.

Reproductive habit unknown, but most likely larviposition from a double-sac uterus.

Type-species.—*Euparaphyto alpina*, new species.

EUPARAPHYTO ALPINA, new species.

Length of body, 8 mm.; of wing, 8 mm. One female, Tirapata, Peru, on the high puna of the Lake Titicaca region, about 13,000 feet, January 28, 1910, on flowers of the dwarf flora.

Head black, more or less silvery. Antennæ and palpi soft black. Facial plate black, thinly silvery pollinose. Parafrontals silvery, faintly golden on middle. The broad frontalia soft black in a direct

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view, but showing a thin silvery bloom in oblique view. The wide parafacials are silvery-white pollinose, with a soft black vitta running from the middle of anterior eye-margin to apex of second antennal joint, and a black spot at lower front corner of eye; the latter appears in oblique view as though continued across parafacial, and in very oblique view the entire parafacial may appear soft black. Cheeks silvery; occiput same, the narrow occipital orbits faintly golden. Thorax, scutellum and abdomen black, golden pollinose; pleuræ with four golden pollinose spots; mesoscutum with three heavy black vittæ, the middle one continued over scutellum; dorsum of abdomen brassy pollinose, with dark median vitta and dusky marmorations on sides of the four main segments, anal or fifth segment wholly reddish-yellow; on venter the golden pollen is very distinct and deeply colored, leaving a blackish hind border to the four main segments. Legs black. Wings clear, long veins deeply yellow, crossveins blackish, faint cloud on small crossvein. Third vein bristly one-half way to small crossvein. In both wings the hind crossvein has a very short stump on inner side of proximal curve. Tegulæ white.

Type.—Cat. No. 15204, U.S.N.M.

CHLORONESIA, new genus.

Evidently belonging to the Sarcophagidæ, in the group of *Sarconesia* and *Blepharicnema*. Differs from *Sarconesia* in the ground color of entire body and legs being metallic green, facialia with only single row of hairs, vibrissæ close on oral margin, front of female less than eye-width, cheeks about one-fifth of eye-height.

Parafacials beset with a few short hairs. Facialia ciliate with weak bristles more than one-half way up. Arista pubescent on basal one-half. Eyes bare. A pair of weak ocellar bristles. Two orbital bristles in female. Frontal bristles descending below base of antennæ, but not reaching base of third joint. Proboscis short, palpi well developed. Second antennal joint short; third joint long and equilateral, reaching almost to vibrissæ, which are exactly on oral margin. Epistoma cut off, but the edge turned so as to make oral margin slightly prominent.

Two sternopleural and three postsutural bristles, sometimes a small third sternopleural. Scutellum with one lateral and a long straight nondecussate apical pair of bristles, between the lateral and apical is a short bristle, and between the two apical is a short submarginal pair of straight bristles. No bristles on dorsum of first two abdominal segments except at sides; third and fourth segments with a marginal row. Legs neither slender nor elongate, middle and hind tibiæ with strong bristles. Apical cell open immediately before wingtip, fourth vein continued in slight stump at

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times and always with wrinkle, hind crossvein nearer to apical crossvein.

Reproductive habit unknown, but probably larviposition from a double-sac uterus.

Type-species.—*Chloronesia andina*, new species.

CHLORONESIA ANDINA, new species.

Length of body, 7 to 8 mm.; of wing 6.5 to 7 5 mm. Two females, near Manchi, on the western slope of the Cordillera Occidental in southern Ecuador, in a humid montaña region, about 7,000 to 7,500 feet, November 22 to 26, 1910, on flowers of *Baccharis floribunda* and on foliage.

Wholly bright metallic green with some bluish or darker reflections. Parafrontals, parafacials, cheeks and orbits thickly light brassy pollinose. Occiput thinly silvery pollinose. Facial plate and facialia obscure yellowish and faintly brassy. Frontalia dark brown to reddish-brown. Antennæ wholly dark brown, arista blackish. Palpi blackish. Pleuræ rather thickly silvery, mesoscutum very thinly so, five very obscure and delicate metallic golden vittæ not due to pollen. Scutellum and abdomen bright green with faint bluish reflections, the venter silvery, the scutellum less silvery, and dorsum of abdomen scarcely or not at all so. Legs black; femora metallic greenish, faintly silvery. Wings nearly clear, with very faint infuscation along veins. Tegulæ white.

Type.—Cat. No. 15205, U.S.N.M.

Subfamily MILTOGRAMMINÆ.

METOPIA MERIDIANA, new species.

Metopia, sp. TOWNSEND, Ant. Ent. Soc. Amer., vol. 4, 1911, p. 130.—TD 3988.

Length of body, 4 to 4.75 mm.; of wing, about 3.5 mm. Five males and one female, Piura, Peru, November 8, 1910, and one male April 7, 1911, on sand and foliage in sunshine.

The males have the inner edge of forward half of parafrontals developed entirely over the part of frontalia between them and meeting on median line like the peak of a roof, the whole of this portion of parafrontals and all of parafacials being like burnished silver. The female lacks all this and in consequence her front is not so sharply produced nor so acute above. She has no silvery on head, all being cinereous with the parafrontals faintly golden, frontalia and antennæ wholly dark brown. Facial plate of male cinereous, antennæ and visible portion of frontalia dark brown, posterior half of parafrontals cinereous with a very faint golden shade. Palpi black. Occiput ashy. All of thorax and abdomen cinereous, with a very faint golden tinge on dorsal portions including scutellum, the usual four faint narrow vittæ on mesoscutum, the second to fourth

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abdominal segments showing dusky-golden marmorations in varying lights. Scutellum with two lateral pairs and an apical decussate pair of bristles, all equal; discal pair atrophied and indistinguishable as a rule. First three abdominal segments with a median marginal pair of bristles in both sexes, but those of first very small in female; anal segment with marginal row. Legs black, claws very short in both sexes. Wings clear, tegulæ white.

Type.—Cat. No. 15206, U.S.N.M. Female; TD 3988, *f. r. s.* Deposits maggots from a double-sac uterus.

PHÆNOPSIS, new genus.

Frontal characters like *Metopia* and *Araba*, but eyes thickly hairy. Bend of fourth vein without stump or wrinkle and ending very close to wingtip. Comes from wholly distinct stock from *Metopia* and allies. The description is made from the male.

Male front in middle about equal to eye-width, vertex about four-fifths of eye-width. Two pairs of reclinate inner orbital bristles. No ocellar bristles. Frontal bristles descending about to base of third antennal joint, facialia strongly ciliate to lowest frontals. Facial plate cut off, epistoma not prominent, vibrissæ at oral margin. Eyes descending almost to vibrissæ; cheeks very narrow, hardly one-eighth of eye-height. Parafacials bare, narrowed below to almost a line. Front conical in profile, face strongly receding. Second antennal joint very short; third in male very long, straight, perfectly equilateral, reaching exactly to oral margin. Arista bare, thickened on basal one-third or so. Male with burnished-silver crescent bounding eye anteriorly and taking up parafacial and oblique outer anterior part of parafrontal, the two silver crescents almost meeting on the median line over the frontalia. Two sternopleural and three postsutural bristles. Three lateral scutellar bristles, the middle one much shorter than the others; an erect slightly forwardly-curved apical pair about same length as middle lateral; a weak separated discal pair. Abdomen short subconical, first segment without median bristles, second with a median marginal pair, third with a marginal row, anal with marginal. Hind tibiæ of male sparsely delicately pectinate, with a longer bristle near middle. Claws of male very short. Apical cell narrowly open just before wingtip, fourth vein bent at obtuse angle, hind cross vein about in middle between small crossvein and bend of fourth vein.

Reproductive habit unknown, but judged to be larviposition from a double-sac uterus.

Type-species.—*Phænopsis arabella*, new species.

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PHÆNOPSIS ARABELLA, new species.

Length of body, 4.5 mm.; of wing, 3.5 mm. One male, Sullana, Peru, valley of Rio Chira, April 11, 1911, on foliage.

Shining polished black; head thinly to thickly pollinose with silvery-white, showing in a densely silvery crescent on parafacials and parafrontals, the oblique inner-posterior portion of latter shining. Antennæ and palpi wholly black, the frontalia brownish. Thorax including pleuræ faintly and thinly silvery pollinose, hardly apparent in some lights, in others very distinct. Two vittæ are indicated on mesoscutum, but indistinctly. Scutellum wholly black and shining. Abdomen shining black, the very narrow anterior margins of second and third segments silvery-white. Legs black. Wings clear; tegulæ watery, the front pair whitish.

Type.—Cat. No. 15207, U.S.N.M.

SARCOMACRONYCHIA TRIVITTATA, new species.

Sarcomacronychia, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 130.—TD 3996.

Length of body, 6.5 to 7 mm.; of wing, 4.75 to 5.5 mm. Two males and two females, Piura, Peru, November 4, 1910, to March 20, 1911, on flowers of species of *Mikania*, on foliage and in house.

Head silvery pollinose, the parafrontals in both sexes faintly golden. Front narrow in both sexes, at vertex about one-sixth of head-width, conspicuously narrowed on anterior half in female but hardly at all so in male. Occiput ashy. Palpi and antennæ black. Body silvery-cinereous pollinose, three heavy black vittæ running uninterruptedly the full length of mesoscutum and scutellum and continued on abdomen a little less definitely to hind border of third segment. The anal segment is wholly rust-golden in both sexes, the other segments silvery pollinose save for the vittæ and narrow blackish hind margins. Two sternopleural and three postsutural bristles. Scutellum with two lateral strong pairs of bristles and a decussate apical pair nearly as strong; discal pair hairlike. Abdomen in both sexes with a median marginal pair of macrochætæ on second segment and a marginal row on third and fourth segments. Legs black, femora faintly pollinose on outer surface, front ones thickly so; claws and pulvilli of male quite strongly elongate, those of female short. Wings clear, tegulæ whitish.

Type.—Cat. No. 15208, U.S.N.M. Female, November 12, 1910; TD 3996.

Deposits maggots from a double-sac uterus.

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EUSELENOMYIA, new genus.

Differs from *Selenomyia* in the macrochætæ being only marginal, the cheeks only about one-fourth of eye-height in female and about one-third in male. Parafacials hairy. Front nearly same width in both sexes, slightly narrower near vertex in male. Both sexes with two strong proclinate orbital bristles. Male with long claws and pulvilli, the female with shorter claws. Only one row of frontal bristles on each side. Antennæ inserted on or below eye-middle. Eyes bare. Arista short, swollen at base. Antennæ short. Facialia bare. Fourth vein with wrinkle at end. Differs from *Paramacronychia* in anterior tarsi of female not being dilated.

Reproductive habit, larviposition from a double-sac uterus.

Type-species.—*Euselenomyia peruviensis*, new species.

EUSELENOMYIA PERUVIENSIS, new species.

Selenomyia, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 130.—TD 3998.

Length of body, 5 to 6.5 mm.; of wing, 4 to 5.5 mm. Numerous specimens of both sexes, Piura, Peru, November 12 and 13, 1910, on foliage.

Whole body cinereous pollinose, the face and front with a distinct golden shade in female, a dusky-golden shade in male. Antennæ wholly dark brown; frontalia brown in a direct view, golden in oblique view. Palpi yellowish or reddish, dusky on tip. Pollen of thorax and abdomen with a faint yellowish tinge, the usual vittæ on mesoscutum, the usual marmorations on abdomen. Two strong sternopleural bristles, a bunch of small bristles between them; three postsutural bristles. Scutellum with two lateral pairs and an apical decussate pair of bristles, all long; also a very short discal pair. First abdominal segment in male with a median marginal pair of macrochætæ, which are either lacking or atrophied in female; second segment in both sexes with a median marginal pair, and third and fourth segments with a marginal row each. Legs black, wings clear, tegulæ watery-whitish.

Type.—Cat. No. 15209, U.S.N.M. Female, November 13, 1910; TD 3998.

Family MEGAPROSOPIDÆ.

Subfamily MEGAPROSOPINÆ.

PERUA, new genus.

Differs from *Neophyto* by having the frontal bristles strong, fourth vein continued in a stump beyond apical crossvein, hind crossvein nearer to apical crossvein, and no discal bristles on intermediate abdominal segments; also in being decidedly more robust and melanic. The apical cell is narrowly open in wing-margin. The arista is bare,

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eyes very sparsely and indistinctly short-hairy, vibrissæ far exceeding the peristomal bristles, frontal bristles descending to opposite base of third antennal joint. Facial plate feebly carinate. Macrochætæ of abdomen normal, rather long. All macrochætæ, including those of front, thorax, scutellum, and legs consisting of rather long bristles. Scutellum with a long apical decussate pair of bristles; two long lateral bristles, the anterior one curved, the posterior one straight and longer; a third very short lateral bristle between the last and the apical pair; a weak discal pair in front of apical pair. Two orbital bristles in female. Front fully as wide in female as both eyes. Long pair of divergent ocellar bristles present. Three postsutural and three sternopleural bristles. Wings with a conspicuous costal spine.

Reproductive habit unknown, but probably larviposition in vicinity of hosts.

Type-species.—Perua cuzcana, new species.

The genus is named in honor of the Republic of Peru.

PERUA CUZCANA, new species.

Length of body, 7.5 mm.; of wing, 6.5 mm. One female, Cuzco, Peru, February 21, 1910, on foliage.

Blackish, silvery-cinereous pollinose. Frontalia, cheeks, second antennal joint, and shafts (not including ends) of tibiæ fulvous or yellowish-brown, the palpi paler yellowish. Parafacials, parafrontals, occiput, mesoscutum and pleuræ silvery-cinerous pollinose, the scutellum slightly so. Pollen continued over all of abdomen, except that the posterior borders of second and third segments appear more shining. Third antennal joint but little longer than the slightly elongated second. Wings slightly yellowish on base, the color following the longitudinal veins, the crossveins black.

Type.—Cat. No. 15210, U.S.N.M.

MEGAPROSOPUS ANDINUS, new species.

Microphthalma, sp. TOWNSEND, Ann. Ent. Soc. Amer., vol. 4, 1911, p. 137.—TD 3915.

Length of body, about 14 mm.; of wing, 13 mm. Numerous specimens of both sexes, Matucana, in the valley of the Rio Rimac, western slope of Cordillera Occidental in central Peru, about 7,800 feet, April 4, 1910, on flowers of species of *Cyclanthera*.

Brownish-red in general ground color; the mesoscutum, disk of first abdominal segment, anterior discal part of second segment, anterior median triangle on third and another on fourth segment, and front blackish. Face, cheeks, and occiput faintly brassy-cinereous pollinose. Antennæ reddish, palpi yellowish. Frontalia brownish. Scutellum and edges of mesoscutum brownish-red, the abdomen except as above noted being of a rather deeper red. Legs and pleuræ of a lighter

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brownish-red. Thorax and abdomen with a faint silvery bloom. Wings faintly infuscated, their bases yellowish. Tegulæ whitish.

The macrochætæ of abdomen are spinelike and as follows: First segment with only one lateral marginal; second with two lateral marginal, and four closely placed median marginal in straight line; third with a marginal row of about 10 above and others below; anal segment with a submarginal or subdiscal row of about 8 above, and a few weaker terminal bristles mixed with the hairs of abdomen. Venter with strong spinelike macrochætæ even on first and second segments where they are aggregated in median patches, being closely set rows with some borne on the ventral plates, the third and fourth segments with complete rows. Scutellum with three strong marginal pairs of rather spinelike bristles, but without short spinelike macrochætæ. Three sternopleural and four postsutural bristles.

Type.—Cat. No. 15211, U.S.N.M. Female; TD 4009, coiled uterus. Cotype, female; TD 3915, *e*.

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NOTES ON CERTAIN AMPHIPODS FROM THE GULF OF MEXICO, WITH DESCRIPTIONS OF NEW GENERA AND NEW SPECIES.

By ARTHUR S. PEARSE,

Of the University of Wisconsin, Madison, Wisconsin.

The following notes are a report on a portion of the amphipods from the Gulf of Mexico in the collection of the United States National Museum. These collections are from several sources and extend over a long period of years. The greater part of them have not yet been examined. Those described below were taken chiefly by the steamers *Fish Hawk* and *Albatross* of the United States Bureau of Fisheries.

Tribe GAMMARIDEA.

Family LYSIANASSIDÆ.

LYSIANOPSIS ALBA Holmes.

Fish Hawk station 7402, Pigeon Key Lake, 9 feet, January 7, 1903; 11 specimens.

Fish Hawk station 7431, Grassy Key Lake, 8 feet, January 28, 1903; 2 specimens.

FIG. 1.—LYSIANOPSIS ALBA. g^2, SECOND GNATHOPOD.

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys, 25–27 fathoms.

Key West, below low tide among algæ; Henry Hemphill; 12 specimens.

Family AMPELISCIDÆ.

AMPELISCA HOLMESII Pearse.

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys, 25–27 fathoms.

Punta Rassa, Charlotte Harbor; Henry Hemphill, February, 1884; 34 specimens.

Family HAUSTORIIDÆ.

HAUSTORIUS ARENARIUS (Slabber).

Pensacola; *Albatross*, February 3, 1885; 16 specimens.

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Family LEUCOTHOIDÆ.

LEUCOTHOË SPINICARPA (Abildgaard).

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys; station 2405, lat. 28° 45′ 00″ N.; long. 85° 02′ 00″ W.; station 2413, lat. 26° 00′ 00″ N.; long. 82° 57′ 30″ W.; in 25–27, 30, 24 fathoms, respectively.

Fish Hawk stations 7397, 7431, 7476, and the stations on January 29, 1903, Florida Bay, in 13, 8, 9, 7–11½ feet. Total, 32 specimens.

Family ANAMIXIDÆ.

ANAMIXIS HANSENI Stebbing.

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys, 25–27 fathoms; 5 specimens.

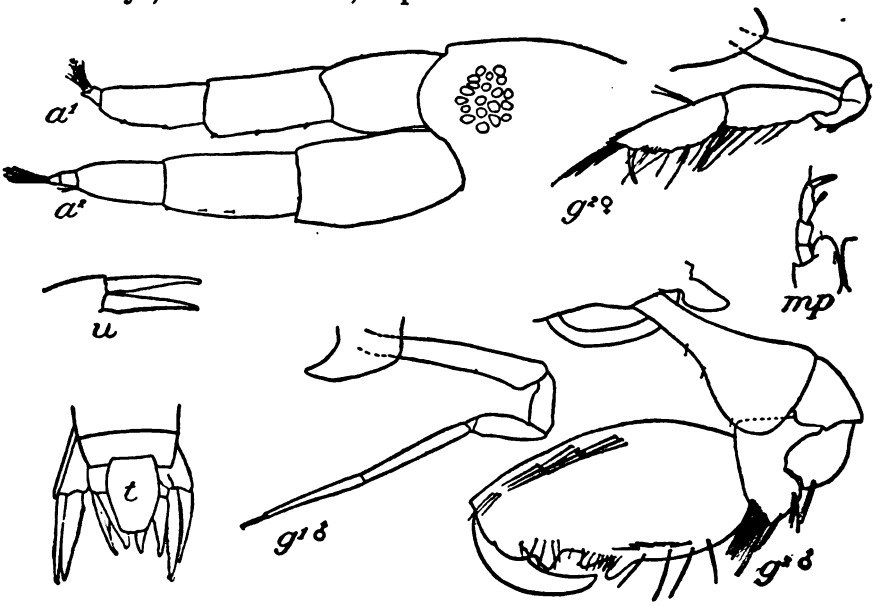

FIG. 2.—COLOMASTIX PUSILLA. a^1, FIRST ANTENNA; a^2, SECOND ANTENNA; g^1, FIRST GNATHOPOD; g^2, SECOND GNATHOPOD; *mp*, MAXILLIPED; *t*, TELSON; *u*, UROPOD.

Family COLOMASTIGIDÆ.

COLOMASTIX PUSILLA Grube.

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys, 25–27 fathoms; 2 females, 1 male.

Family GAMMARIDÆ.

ELASMOPUS RAPAX A. Costa.

Fish Hawk station 7402, Pigeon Key Lake, 9 feet; 4 specimens.

Florida Bay; *Fish Hawk*, January 29, 1903, 7–11½ feet; 8 specimens.

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Key West, below low tide among algæ; Henry Hemphill; 21 specimens.

MELITA DENTATA (Krøyer).

Cameron, Louisiana; L. R. Cary; several specimens.

MELITA NITIDA Smith.

Old stump in Mussel Bayou; *Fish Hawk*, February 23, 1898; 1 male.

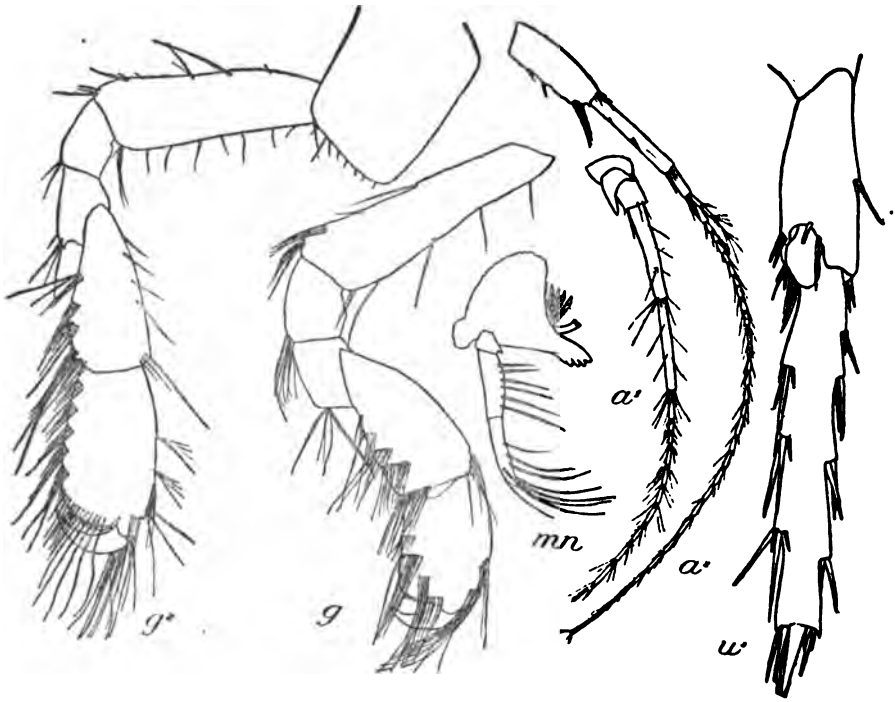

FIG. 3.—MELITA DENTATA. a^1, FIRST ANTENNA; a^2, SECOND ANTENNA; g, FIRST GNATHOPOD; g^2, SECOND GNATHOPOD; mn, MANDIBLE; u^3, THIRD UROPOD.

MELITA FRESNELII (Audouin).

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys, 25–27 fathoms; 2405, lat. 28° 45′ 00″ N.; long. 85° 02′ 00″ W., 30 fathoms; 2413, lat. 26° 00′ 00″ N.; long. 82° 57′ 30″ W., 24 fathoms.

Fish Hawk stations 7416, 10½ feet; 7431, 8 feet; Florida Bay, all stations on January 29, 1903, 7–11½ feet.

Total, 13 males, 32 females.

Family TALITRIDÆ.

ORCHESTIA GRILLUS (Bosc).

Margin of Matagorda Bay, Texas; J. D. Mitchell, January, 1902; several specimens of both sexes; same locality and collector, April 14, 1902, under driftwood, at Well Camp, Alligator Head.

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ORCHESTIA PLATENSIS Krøyer.

Cameron, Louisiana; L. R. Cary; 1 specimen.

TALORCHESTIA LONGICORNIS (Say).

Chandeleur Islands, Louisiana; L. R. Cary.

Family AORIDÆ.

LEMBOPSIS, new genus.

Body slender. Side plates rather shallow, rounded. Antenna 2 about half as long as 1; accessory flagellum well developed. Lower lip with mandibular processes strongly produced. Maxilla 1 with inner plate small and bearing one apical seta; palp slender, second segment with slender spines at tip. Maxillipeds with inner and outer plates well developed, no teeth but many setæ on inner plate; finger of palp rather stout, exceeding preceding segment in length. Gnathopod 1 in male: fifth and sixth segments stout, both armed on ventral side with a strong spinous process; finger overlapping the palm. Peræopods 3–5 with the second segment not very widely expanded; fourth longer than third, fifth much longer than fourth. Uropod 3: rami subequal, much longer than peduncle.

Type of the genus.—Lembopsis spinicarpus.

LEMBOPSIS SPINICARPUS, new species.

Rostrum small; sinus for first antenna deep, extending almost as far as the posterior corner of the eye. Eyes rounded but with antero-posterior axis slightly elongated.

First antenna almost as long as body; first segment of peduncle longer than head; antepenultimate segment one-fourth longer than first; ultimate segment one-fourth as long as antepenultimate; flagellum 23–25-segmented; accessory flagellum 7-segmented. Second antenna reaching the tip of accessory flagellum of first; last two segments of peduncle subequal in length; flagellum 10-segmented.

Mandible with third segment of palp longer than second and strongly ciliated on inner margin. Maxilla 1: inner plate with one plumose seta; outer plate with eight spines: palp slender. Maxillipeds: inner and outer plates broad and well armed. Lower lips with rather long mandibular processes.

Gnathopod 1 of male: second segment devoid of long setæ; fifth segment slightly more than half as long as sixth, broad, thick; each produced into a strong acute process on ventral margin; a deep sinus between spinous process on sixth segment and palm, which is straight; dactyl long, curved, finely denticulate on inner margin. Gnathopod 2: fifth and sixth segments oval and densely covered

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with long hairs on both margins; fifth segment slightly longer than sixth; palm slightly oblique; finger finely denticulate on inner margin. Gnathopods of female smaller than in male; first, with palm oblique and bearing a small tooth at its distal end; second, with palm nearly transverse and bearing a similar but slightly smaller tooth.

Peræopods 1 and 2 glandular. Peræopod 5 much longer than others.

Uropods 1–3 armed with spines, those on last more slender than rest; peduncle of uropod 3 short, inner ramus slightly longer than outer. Telson about as broad as long, with a semicircular notch at tip, two apical bristles on either side.

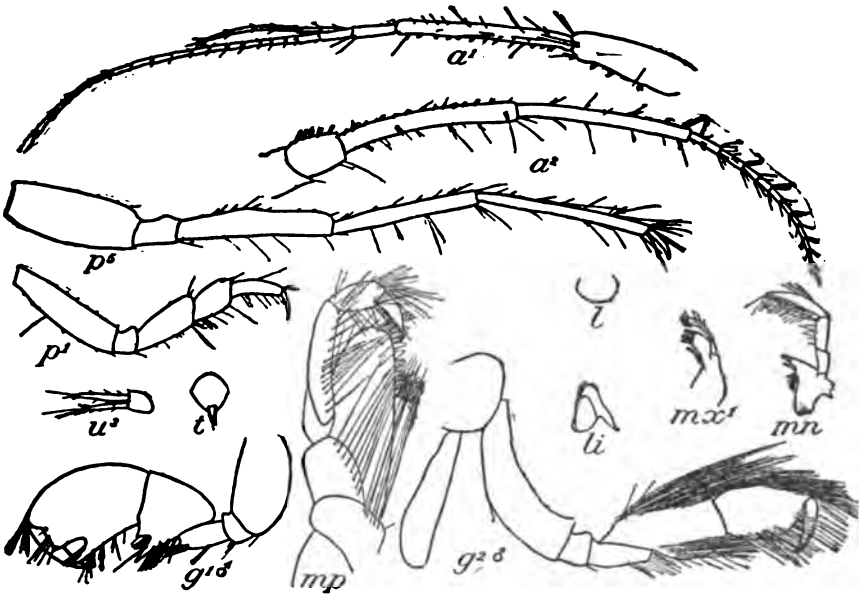

FIG. 4.—LEMBOPSIS SPINICARPUS. a^1, FIRST ANTENNA; a^2, SECOND ANTENNA; g^1, FIRST GNATHOPOD; g^2, SECOND GNATHOPOD; *l*, UPPER LIP; *li*, LOWER LIP; *mn*, MANDIBLE; *mp*, MAXILLIPED; mx^1, FIRST MAXILLA; p^1, FIRST PERÆOPOD; p^5, FIFTH PERÆOPOD; *t*, TELSON; u^3, THIRD UROPOD.

Length, 10 mm.

Described from two males and four females taken by Henry Hemphill in 1885, among algæ below low tide mark at Key West, Florida. Other specimens appeared in a collection made by the *Fish Hawk* at station 7431, Grassy Key, in 8 feet, and station 7397, Big Spanish Key Channel, in 13 feet.

Type.—Cat. No. 13534, U.S.N.M.

LEMBOS SMITHI (Holmes).

Albatross stations 2369–2374, Delta of Mississippi to Cedar Keys, 25–27 fathoms.

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Family PHOTIDÆ.

CHEVALIA MEXICANA, new species.

Body smooth without spines or teeth, slender. Head longer than first two segments; body segments progressively longer posteriorly. Eyes round; ocular lobe rounded. Epimera shallow, and none of them excavate nor produced.

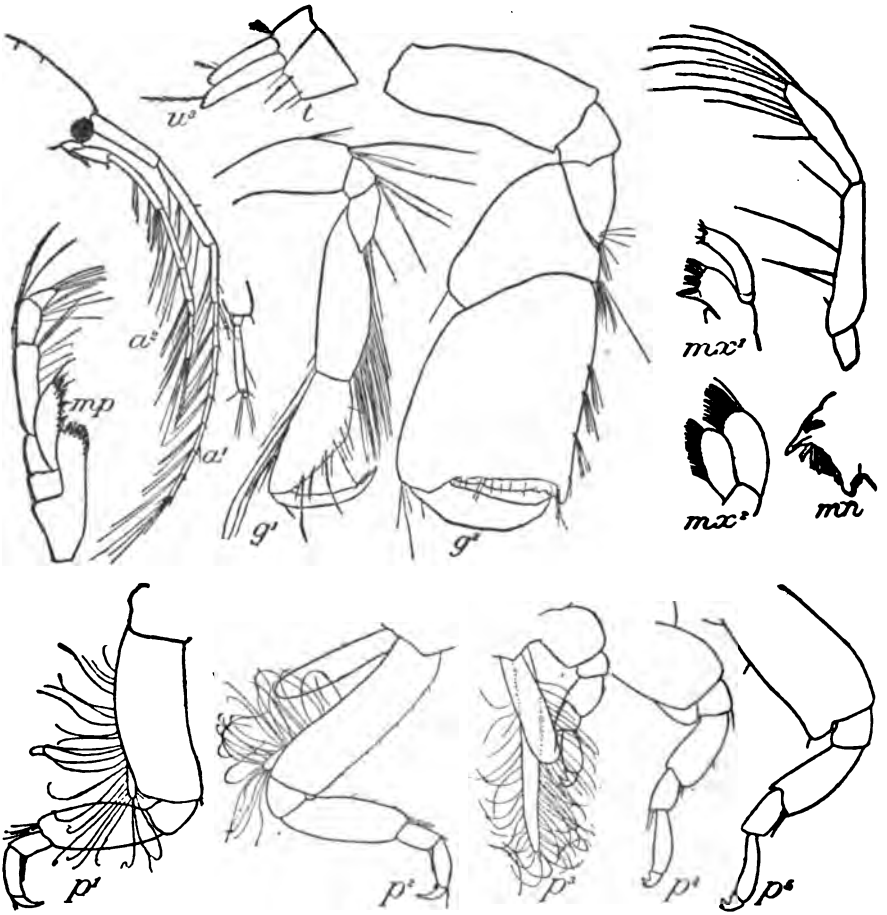

FIG. 5.—CHEVALIA MEXICANA. a^1, FIRST ANTENNA; a^2, SECOND ANTENNA; g^1, FIRST GNATHOPOD; g^2, SECOND GNATHOPOD; *mn*, MANDIBLE; *mp*, MAXILLIPED; mx^1, FIRST MAXILLA; mx^2, SECOND MAXILLA; p^1, FIRST PEREOPOD; p^2, SECOND PEREOPOD; p^3, THIRD PEREOPOD; p^4, FOURTH PEREOPOD; p^5, FIFTH PEREOPOD; *t*, TELSON; u^3, THIRD UROPOD.

First antenna about two-thirds length of body; first segment of peduncle about as long as third; flagellum 8-segmented; accessory flagellum with a short basal segment, a longer middle, and a minute terminal segment. Second antenna half as long as first; first seg-

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ment of peduncle one-third as long as second, second one-half third; flagellum 5-segmented, longer than last two peduncular segments.

Mandibles small, shorter than second segment of palp; cutting edge double; molar tubercle prominent and narrow; palp reaching to middle of third segment of second antenna, first segment small, second and third subequal.

Maxillipeds with inner plate reaching end of first segment of palp, spinous at tip; outer plate narrower, reaching middle of second segment of palp, with spines on inner margin longer and slenderer toward tip; first and third segments of palp subequal, second twice as long, fourth more than half as long as third, the apex rounded and setose.

First gnathopods with side plates small, front angle rounded; basal segment slightly shorter than carpus, curved; carpus longer than propodus; palm oblique, straight, poorly defined; dactyl three times as long as propodus.

Second gnathopods with side plates small, rounded; basal segment equal to next three in length, twice as wide as merus; propodus one-third longer than triangular carpus; palm transverse, defined by a strong tooth inside which is a slight notch to receive the dactyl; dactyl stout, curved.

First and second peræopods longer than second gnathopods; stout side plates small and rounded, basal segment longer than next three, with anterior margin convex in first and nearly straight in second; merus nearly as long as combined ischium, carpus and propodus, twice as wide as last two; dactylus half as long as propodus. Third peræopod hardly reaching end of basal segment of second; basal segment about as wide as long, front margin straight; ischium a little shorter than carpus; merus subequal to propodus; dactyl reversed, with a secondary tooth. Fourth peræopod like third, but longer. Fifth longer than fourth; the basal segment straight, twice as long as wide, and with anterior distal angle forming a rounded right angle; otherwise similar to fourth. Last peræopod not reaching beyond third pleon segment.

First uropod with peduncle subequal to outer ramus, which is one-fifth shorter than the inner, obliquely truncated at tip and armed with a group of short, blunt spines; inner ramus styliform, curved, spinulous on proximal half of outer margin. Second uropod similar to first; outer ramus shorter than peduncle, which is subequal to inner ramus; inner ramus not spinulous on margin. Third uropod with peduncle shorter than either ramus; inner ramus longer than outer; both rami rounded and setose on outer margin at tips.

Telson truncate at tip; with two setæ at distal angles and four on upper surface.

Length, 6 mm.

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Seventy-one specimens were collected by the Fisheries steamer *Albatross* between the Delta of the Mississippi and Cedar Keys, stations 2369–2374, in 25 to 27 fathoms of water.

Type.—Cat. No. 43638, U.S.N.M.

Family AMPITHOIDÆ.

AMPITHOË LONGIMANA (Smith).

Florida Bay at a *Fish Hawk* station on January 29, 1903, 7–11½ feet; 1 female.

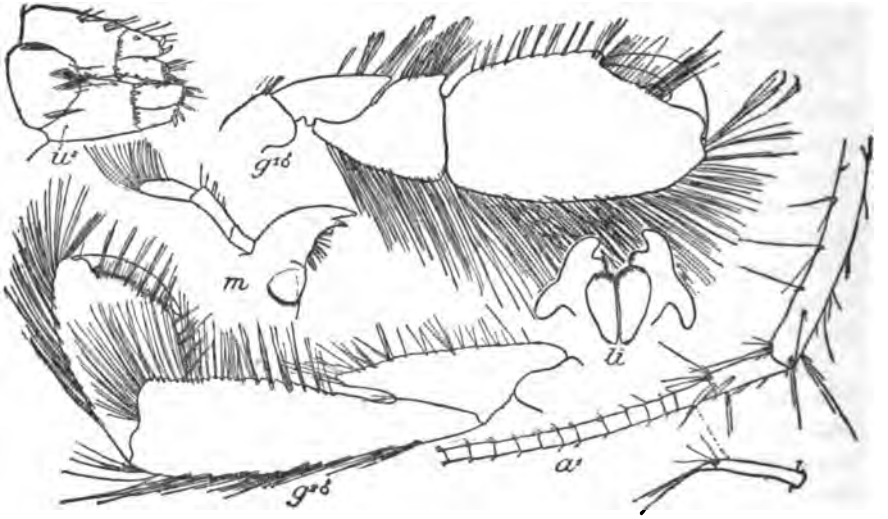

FIG. 6.—GRUBIA COMPTA. a^1, FIRST ANTENNA; g^1, FIRST GNATHOPOD; g^2, SECOND GNATHOPOD; $\bar{M}$, LOWER LIP; m, MANDIBLE; u^3, THIRD UROPOD.

GRUBIA COMPTA Smith (?).

Harbor Key, Florida; Union College collection (No. 798); 1 specimen. Several specimens from Key West, Florida; below low tide among algæ; H. Hemphill. Some in the collections of the Fisheries steamer *Fish Hawk* in Florida Bay on January 29, 1903, 7–11½ feet.

All these specimens differ from Holmes's figures. The first gnathopods of the male are larger than the second; the propodus of the second gnathopod is shorter but more stocky than the carpus; there are not triangular acute teeth at the post-lateral angles of abdominal segments 2 and 3.

GRUBIA, sp.?.

Twenty-one specimens of a second species of this genus came from Key West, Florida; H. Hemphill, collector.

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Family COROPHIIDÆ.

CERAPUS TUBULARIS Say.

Fish Hawk station 7292, Gulf of Mexico, off Northwest Channel, 10½ fathoms; several specimens.

UNCIOLA LAMINOSA, new species.

Body dorsally broad, flattened. Head with rostrum distinct, acute; lateral margins straight, posterior angles rounded. Side plates very shallow, first and second with front angles forming strong acute spines, third and fourth somewhat angulate in front but not

FIG. 7.—UNCIOLA LAMINOSA. a^1, FIRST ANTENNA; a^2, SECOND ANTENNA; e^3, THIRD EPIMERITE; g^1, FIRST GNATHOPOD; g^2, SECOND GNATHOPOD; *mn*, MANDIBLE; *mp*, MAXILLIPED; mx^1, FIRST MAXILLA; mx^2 SECOND MAXILLA; *t*, TELSON; u^1, FIRST UROPOD; u^2, SECOND UROPOD; u^3, THIRD UROPOD.

spiny. Pleon segment 3, postero-lateral angle acute, with a shallow sinus above. Eyes oval.

First antenna elongate, second segment about equal to first in length, third more than half as long as second; flagellum not as long as peduncle, 7-segmented, accessory flagellum unknown except for one segment (perhaps 1-segmented). Second antenna with the two basal segments laminar and spiny on outer margin; first segment less than two-thirds as long as second, third shorter than second and slender; flagellum 5-segmented. First maxilla with nine teeth on outer plate and four at tip of palp. First gnathopod with second segment of medium width; fifth segment short, broad, produced on posterior margin; sixth very broad, with basal process projecting

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much beyond that of the fifth segment, its apex rounded; palm sinuate, crenulate, forming a deep sinus just beyond the basal process; finger reaching basal process of sixth segment, stout, conical, teeth on inner margin prominent. Second gnathopod with fifth segment shorter than sixth, both setose; palm transverse; finger slender, not quite so long as palm.

Peræopods 1–5, slender, second segment little expanded.

Uropods 1 and 2 elongate, armed with stout spines on outer margin; inner ramus minute with one long apical seta. Uropod 3 with ramus longer than peduncle (the figure shows only the ramus). Telson rounded, entire.

Length, 4.2 mm.

Seven specimens were taken by the *Albatross* at stations 2369–2374, between Delta of Mississippi and Cedar Keys; 25 to 27 fathoms. Type-locality, Punta Rassa, Charlotte Harbor; H. Hemphill; 1 specimen.

Type.—Cat. No. 43639, U.S.N.M.

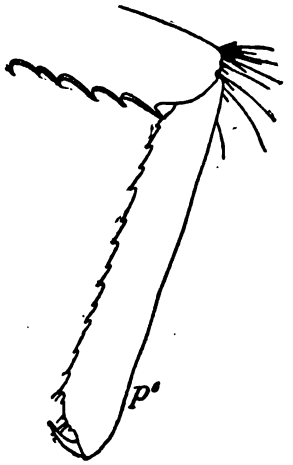

FIG. 8.—CYSTISOMA SPINOSUM. p^5, FIFTH PERÆOPOD.

ERICTHONIUS RUBRICORNIS (Stimpson).

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys; 25–27 fathoms, 1 male; station 2388 (lat. 29° 24′ 30″ N.; long. 88° 01′ 00″ W.), 35 fathoms; 5 males, 12 females.

Tribe HYPERIIDEA.

CYSTISOMA SPINOSUM (J. C. Fabricius).

Albatross station 2392 (lat. 28° 47′ 39″ N.; long. 87° 21′ 00″), 724 fathoms, 1 specimen, 47 mm. long. Agrees with Stebbing's description except for the fact that the first antennæ are very long—31 mm.

PHRONIMA SEDENTARIA (Forskål).

Fish Hawk station 7284, Gulf Stream, off Key West, February 19, 1902, 245 fathoms, 2 specimens; station 7299, Gulf Stream, off Key West, February 22, 1902, a female carrying eggs, 109 fathoms.

PHROSINA SEMILUNATA Risso.

Albatross station 2393, between Delta of Mississippi and Cedar Keys, 4 specimens; station 2398, same locality, 1 specimen.

Tribe CAPRELLIDEA.

CAPRELLA GEOMETRICA Say.

Fish Hawk station 7292, Gulf of Mexico, off Northwest Channel, 10½ fathoms.

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CAPRELLA, sp.?.

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys, 25–27 fathoms, 1 female.

PROTELLOPSIS STEBBINGII Pearse.

Albatross stations 2369–2374, between Delta of Mississippi and Cedar Keys, 25–27 fathoms, 1 female.

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THE CRINOIDS OF THE MUSEUM FUER NATURKUNDE, BERLIN.

By AUSTIN HOBART CLARK,

Assistant Curator, Division of Marine Invertebrates, U. S. National Museum.

PREFACE.

Shortly after I began the study of the recent crinoids Drs. W. Weltner and R. Hartmeyer of the Museum für Naturkunde offered me for study the collection which had been brought together by the German steamer *Gazelle* on her memorable voyage in 1874–1876. When the work on this material was completed these gentlemen most generously offered me the entire collection of their museum, which was sent to Washington in order that I might compare the specimens directly with those in the collection of the United States National Museum. The debt of gratitude which I owe to Drs. Weltner and Hartmeyer for their kindness can only be appreciated when it is remembered that the collection includes the types of many of the species described by Prof. Johannes Müller in 1841 and 1849, and by Dr. Clemens Hartlaub in 1890.

During the summer of 1910 I visited Berlin and examined the few specimens which had not been sent to me, and also some others which had been recently received.

The Museum für Naturkunde has generously permitted the United States National Museum to retain a number of the specimens belonging to their collection, and to have photographs made of all the specimens of particular interest.

The species represented by the specimens retained, and the localities, are the following:

COMISSIA HARTMEYERI, new species, Eig Tor, Gulf of Suez.

Comatulella brachiolata (Lamarck), Koombana Bay, Western Australia.

Comatula purpurea (J. Müller), Useless Inlet, Shark Bay, Western Australia.

Comatula purpurea (J. Müller), Freycinet Reach, Shark Bay, Western Australia.

COMANTHUS WAHLBERGII (J. Müller), Port Natal.

AMPHIMETRA AFRICANA A. H. Clark, Bagamoyo, German East Africa.

CRASPEDOMETRA MADAGASCARENSIS A. H. Clark, Madagascar.

HETEROMETRA SAVIGNII (J. Müller), Red Sea.

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SELENEMETRA FINSCHII (Hartlaub), New Britain.
DICHROMETRA PALMATA (J. Müller), Red Sea.
Dichrometra protectus (Lütken), New Guinea.
DECAMETRA MODICA A. H. Clark, Bagamoyo.
OLIGOMETRA OCCIDENTALIS A. H. Clark, Bagamoyo.
Tropiometra carinata (Lamarck), Fouquet Reef, Mauritius.
Tropiometra picta (Gay), Rio de Janeiro.
Ptilometra macronema (J. Müller), Koombana Bay.
Antedon adriatica A. H. Clark, Trieste.
Compsometra incommoda (Bell), Koombana Bay.
IRIDOMETRA MAURITIANA A. H. Clark, Mauritius.
LEPTOMETRA PHALANGIUM (J. Müller), Nice.
Leptometra phalangium (J. Müller), Sicily.
Hathrometra prolixa (Sladen), Norwegian Sea.
Hathrometra prolixa (Sladen), Spitzbergen.
(The specimens given in small capitals are cotypes of the species.)

HISTORICAL ACCOUNT OF THE COLLECTION.

The first notices of specimens in the Museum für Naturkunde were published by Prof. Johannes Müller, who made a number of them the types, and others the types in part, of new species described in 1841, 1843, and 1849.

In 1869 Prof. E. von Martens recorded some specimens which had been brought back by Count von der Decken from his trip to East Africa, while in 1877, and again in 1887, Prof. Ludwig von Graff mentioned, as hosts for Myzostoma described by him, a few more.

In the preparation of the *Challenger* report upon the comatulids (published in 1888) Dr. P. H. Carpenter visited the museum and studied the collections, paying particular attention to the types of Müller's species; but he never published any detailed account of them, merely including references to a few forms in his monograph.

In the following year Prof. Th. Studer published some records of comatulids which had been collected by the *Gazelle* during her trip to the East Indies and to Western Australia. These records were mostly indefinite, giving only the genus to which the animals belonged. Later the material was sent to Doctor Carpenter for more accurate determination, but he was unable to complete a report upon it before he died.

In 1890 Dr. Clemens Hartlaub published preliminary diagnoses of several new species based upon the material in this museum, in the following year describing them in greater detail and figuring them, and also recording many others not previously noticed.

The specimens recorded by Prof. Ludwig Döderlein in the Fauna Arctica, which were collected by Römer and Schaudinn at Spitzbergen, are in the collection of this museum.

In 1909 the *Gazelle* crinoids were sent to the present author; two new species were described from among them, and later a general

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account of the collection was published. Two years later the same author published a monograph of the recent crinoids of Africa based largely upon specimens in this collection, and an account of the crinoids of the Hamburg west Australian expedition, also based upon specimens now in part in this museum. In addition a few records gathered from the data on the labels of the specimens have been included in his monographs of the recent crinoids of Australia, and of the crinoids of the Indian Ocean.

TYPES IN THE COLLECTION.

The collection of the Museum für Naturkunde contains the following specimens, which are either types, or were considered in the drawing up of the original diagnoses:

Alecto rosea J. MÜLLER, 1841 (Monatsb. k. preuss. Akad. Wiss., 1841, p. 183; Archiv Naturg., 1841, vol. 1, p. 143; Die Gattung Comatula, p. 250).
=COMATULELLA BRACHIOLATA (Lamarck).[1]

Alecto echinoptera J. MÜLLER, 1841 (Monatsb. k. preuss. Akad. Wiss., 1841, p. 183; Archiv Naturg., 1841, vol. 1, p. 143; Die Gattung Comatula, p. 250).
=COMACTINIA ECHINOPTERA (J. Müller).

Alecto phalangium J. MÜLLER, 1841 (Monatsb. k. preuss. Akad. Wiss., 1841, p. 182; Archiv Naturg., 1841, vol. 1, p. 142; Die Gattung Comatula, p. 253).
=LEPTOMETRA PHALANGIUM (J. Müller).

Alecto eschrichtii J. MÜLLER, 1841 (Monatsb. k. preuss. Akad. Wiss., 1841, p. 183; Archiv Naturg., 1841, vol. 1, p. 142; Die Gattung Comatula, p. 254).
=HELIOMETRA GLACIALIS (Leach).

Alecto savignii J. MÜLLER, 1841 (Monatsb. k. preuss. Akad. Wiss., 1841, p. 185; Archiv Naturg., 1841, vol. 1, p. 144; Die Gattung Comatula, p. 257).
=HETEROMETRA SAVIGNII (J. Müller)+ CRASPEDOMETRA ATER A. H. Clark.

Alecto palmata J. MÜLLER, 1841 (Monatsb. k. preuss. Akad. Wiss., 1841, p. 185; Archiv Naturg., 1841, vol. 1, p. 144; Die Gattung Comatula, p. 261).
=DICHROMETRA PALMATA (J. Müller).[2]

Alecto wahlbergii J. MÜLLER, 1843 (Archiv Naturg., 1843, vol. 1, p. 131; Die Gattung Comatula, p. 256).....=COMANTHUS WAHLBERGII (J. Müller).[3]

Alecto purpurea J. MÜLLER, 1843 (Archiv Naturg., 1843, vol. 1, p. 132; Die Gattung Comatula, p. 248).....=COMATULA PURPUREA (J. Müller).

Comatula cumingii J. MÜLLER, 1849 (Die Gattung Comatula, p. 255).
=COMATULA PECTINATA (Linnæus).

Antedon martensi HARTLAUB, 1890 (Nachr. Ges. Göttingen, Mai 1890, p. 170; Die Comatulidenfauna des Indischen Archipels, p. 21, pl. 1, figs. 3 and 6).
=HIMEROMETRA CRASSIPINNA (Hartlaub).

Antedon finschii HARTLAUB, 1890 (Nachr. Ges. Göttingen, Mai 1890, p. 176; Die Comatulidenfauna des Indischen Archipels, p. 47, pl. 3, fig. 32).
=SELENEMETRA FINSCHII (Hartlaub).

Antedon tenuipinna HARTLAUB, 1890 (Nachr. Ges. Göttingen, Mai 1890, p. 178; Die Comatulidenfauna des Indischen Archipels, p. 54, pl. 3, figs. 28, 30, and 34).
=STEPHANOMETRA TENUIPINNA (Hartlaub).

[1] The other specimens included in the original diagnosis are in the Vienna Museum.

[2] Only the specimens collected by Hempricht and Ehrenberg in the Red Sea belong to this species; those collected by Eschricht in India, and those from Zamboanga in the Paris Museum which he mentions, are examples of *D. protectus*.

[3] The other specimens included in the original diagnosis are in the Stockholm Museum.

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Antedon conifera HARTLAUB, 1890 (Nachr. Ges. Göttingen, Mai 1890, p. 173; Die Comatulidenfauna des Indischen Archipels, p. 76, pl. 4, fig. 46; pl. 5, figs. 51 and 56).
=COSMIOMETRA CONIFERA (Hartlaub).

Antedon japonica HARTLAUB, 1890 (Nachr. Ges. Göttingen, Mai 1890, p. 172; Die Comatulidenfauna des Indischen Archipels, p. 84, pl. 5, fig. 49).
=OLIGOMETRA JAPONICA (Hartlaub).

Ptilometra dorcadis A. H. CLARK, 1909 (Proc. Biol. Soc. Washington, vol. 22, p. 39; Bull. mus. hist. nat., 1911, No. 4, pp. 244, 255, fig. 1 B).
=PTILOMETRA MACRONEMA (J. Müller).

Oligometra studeri A. H. CLARK, 1909 (Proc. Biol. Soc. Washington, vol. 22, p. 41; see also p. 88).....=DECAMETRA STUDERI (A. H. Clark).

Amphimetra africana A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 20).
=AMPHIMETRA AFRICANA A. H. Clark.

Craspedometra ater A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 21).
=CRASPEDOMETRA ATER A. H. Clark.

Craspedometra madagascarensis A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 23).
=CRASPEDOMETRA MADAGASCARENSIS A. H. Clark.

Decametra möbiusi A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 31).
=DECAMETRA MÖBIUSI A. H. Clark.

Decametra modica A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 32).
=DECAMETRA MODICA A. H. Clark.

Oligometra serripinna var. *occidentalis* A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 33).....=OLIGOMETRA S. OCCIDENTALIS A. H. Clark.

Tropiometra encrinus A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 36).
=TROPIOMETRA ENCRINUS A. H. Clark+
TROPIOMETRA AUDOUINI, new species+
TROPIOMETRA INDICA, new species.

Iridometra mauritiana A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 40).
=IRIDIOMETRA MAURITIANA A. H. Clark.

RECORDED SPECIMENS OTHER THAN TYPES.

The following references to specimens, other than types, in the collection of the Museum für Naturkunde appear in the literature:

Pentacrinus caput-Medusæ Lamarck; J. MÜLLER, 1843 (Abh. k. preuss. Akad. Wiss., 1841, p. 185).....=ISOCRINUS ASTERIA (Linnæus).

Comatula (Alecto) carinata Lamarck; J. MÜLLER, 1849 (Abh. k. preuss. Akad. Wiss., 1847, p. 252; Mauritius).....=TROPIOMETRA CARINATA (Lamarck).

Comatula (Alecto) mediterranea Lamarck; J. MÜLLER, 1849 (Abh. k. preuss. Akad. Wiss., 1847, p. 252).
(*a*) Specimens from Trieste.....=ANTEDON ADRIATICA A. H. Clark.
(*b*) Specimens from Marseilles and Nice.=ANTEDON MEDITERRANEA (Lamarck).

Comatula (Alecto) sarsii Düben and Koren; J. MÜLLER, 1849 (Abh. k. preuss. Akad. Wiss., 1847, p. 254).....=HATHROMETRA SARSII (Düben and Koren).

Eudiocrinus japonicus P. H. Carpenter; P. H. CARPENTER, 1888 (*Challenger* Report, p. 85; Japan).....=PENTAMETROCRINUS TUBERCULATUS (A. H. Clark).

Antedon carinata (Lamarck); P. H. CARPENTER, 1888 (*Challenger* Report, p. 202)
=TROPIOMETRA CARINATA (Lamarck)+
TROPIOMETRA AUDOUINI, new species+
TROPIOMETRA INDICA, new species.

Actinometra purpurea (J. Müller); P. H. CARPENTER, 1888 (*Challenger* Report, p. 278; tentative synonym of *Act. pectinata*).....=COMATULA PURPUREA (J. Müller).

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Actinometra rosea (J. Müller); P. H. CARPENTER, 1888 (*Challenger* Report, p. 278; synonym of *Act. brachiolata*).....=COMATULELLA BRACHIOLATA (Lamarck).

Actinometra coppingeri Bell; P. H. CARPENTER, 1888 (*Challenger* Report, p. 321).
=CAPILLASTER MULTIRADIATA (Linnæus).

Actinometra parvicirra (J. Müller); P. H. CARPENTER, 1888 (*Challenger* Report, p. 342; Batjan).....=COMANTHUS PARVICIRRA (J. Müller).[1]

Antedon palmata (J. Müller); HARTLAUB, 1891 (Die Comatulidenfauna des Indischen Archipels, p. 51).

(*a*) Five from the Red Sea; Hempricht and Ehrenberg.
=DICHROMETRA PALMATA (J. Müller).

(*b*) Two from the Red Sea; "*Antedon* sp." P. H. Carpenter, MS.
=DICHROMETRA PALMATA (J. Müller).

(*c*) Red Sea; Jar No. 2019.....=DICHROMETRA PALMATA (J. Müller).

(*d*) Singapore; Jagor.....=DICHROMETRA PROTECTUS (Lütken.)[2]

Antedon tuberculata P. H. Carpenter; HARTLAUB, 1891 (Die Comatulidenfauna des Indischen Archipels, p. 57; no data given).
=STEPHANOMETRA TUBERCULATA (P. H. Carpenter)

Antedon imparipinna P. H. Carpenter; HARTLAUB, 1891 (Die Comatulidenfauna des Indischen Archipels, p. 65; Tonga Islands; Batjan; New Guinea).
=DICHROMETRA PROTECTUS (Lütken).[3]

Antedon flagellata (J. Müller); HARTLAUB, 1891 (Die Comatulidenfauna des Indischen Archipels, p. 75; Singapore).....=DICHROMETRA FLAGELLATA (J. Müller.)[4]

Capillaster multiradiata (Linnæus); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 364).
=CAPILLASTER MULTIRADIATA (Linnæus).

Comaster typica (Lovén); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 365).
=COMASTER TYPICA (Lovén).

Comanthus rotalaria (Lamarck); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 365).
=COMANTHUS PARVICIRRA (J. Müller).

Comanthus briareus (Bell); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 365).
=COMANTHERIA BRIAREUS (Bell).

Zygometra microdiscus (Bell); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 367).
=ZYGOMETRA MICRODISCUS (Bell).

Zygometra elegans (Bell); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 367).
=ZYGOMETRA ELEGANS (Bell).

Dichrometra protectus (Lütken); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 367).
=DICHROMETRA PROTECTUS (Lütken).

Dichrometra palmata (Müller); A. H. CLARK, 1909 (Zool. Anzeiger, vol. 34, p. 367).
=DICHROMETRA PROTECTUS (Lütken).

Comanthus (*Validia*) *parvicirra* (J. Müller); A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 18).

(*a*) Seychelles; Berlin Museum.....=COMISSIA IGNOTA A. H. Clark.

(*b*) Red Sea; Dr. Hartmeyer.....=COMISSIA HARTMEYERI, new species.

Cenometra emendatrix (Bell); A. H. CLARK, 1911 (Proc. U. S. Nat. Mus., vol. 40, p. 28).
=CENOMETRA EMENDATRIX (Bell).

[1] Carpenter also, in summing up all that is known about the recent comatulids, mentions all the species which were described by Professor Müller from specimens in the Museum für Naturkunde.

[2] For information in regard to the specimen from Djeddah, see Notes from the Leyden Museum, vol. 33, p. 187.

[3] Doctor Hartlaub calls attention to the fact that Müller in describing *Alecto palmata* gives the number of arms as 35–40, whereas true *palmata* has but 30; Müller's diagnosis of *palmata* was partly based upon specimens of *Dichrometra protectus*, a 40-armed species, and he seems to have taken the arm number from these. Müller's specimens of *palmata* from India and from Zamboanga (Die Gattung Comatula, p. 261) are both representatives of *protectus*.

[4] For the synonymy of this species see Notes from the Leyden Museum, vol. 33, p. 184.

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ANNOTATED LIST OF THE SPECIES.

Family COMASTERIDÆ.

Subfamily CAPILLASTERINÆ.

COMATELLA STELLIGERA (P. H. Carpenter).

[For the synonymy, see Vid. Medd. naturh. For. København, 1909, p. 136; and The Crinoids of the Indian Ocean.]

1. New Guinea; Cat. No. 5347.—One small specimen with 30 arms; the cirri are XIV, 19–21.

CAPILLASTER MULTIRADIATA (Linnæus).

[For the synonymy, see Vid. Medd. naturh. For. København, 1909, p. 134; Proc. U. S. Nat. Mus., vol. 40, p. 16; and The Crinoids of the Indian Ocean.]

1. Dirk Hartog Island, Western Australia; *Gazelle*.—One specimen (see Zool. Anzeiger, vol. 34, No. 11/12, p. 364).

2. Amboina; Professor von Martens; Cat. No. 1329.—One specimen with 20 arms 115 mm. long.

3. St. Mathias Island; Herr H. Schöde.—One small specimen.

4. Singapore; Professor von Martens; Cat. No. 2455.—One 13-armed specimen.

5. British North Borneo; Herr Pagel; Cat. No. 4744.—Two specimens; one of these has about 25 arms 110 mm. long, the IIIBr series all 3(2+3), always internal; the other has 19 arms 85 mm. long, no IIIBr series being present.

6. ? China; Cat. No. 5285.—One small specimen with 31 arms 80 mm. long.

7. No locality.—One specimen.

COMISSIA IGNOTA A. H. Clark.

Comissia ignota A. H. Clark, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 17.

1. Seychelles; Professor Brauer; Cat. No. 4745.—One specimen.

COMISSIA HARTMEYERI, new species.

Description.—Centrodorsal thin discoidal, the dorsal pole flat, about 1 mm. in diameter.

Cirri VIII–XIV (usually about X), 10–13 (usually 12 or 13), 4.5 to 6 mm. (usually about 5 mm.) long. The first segment is short, the second about as long as broad, the third from two to three times as long as its median diameter; the fourth segment is the longest, three and one-half to four times as long as the median diameter; the fifth is not quite so long; the following segments rapidly decrease in length so that the ninth and following are about as long as broad; the fifth is a transition segment; the longer proximal segments are oval in cross section and are strongly "dice-box shaped," but the outer short segments have straight sides and are strongly compressed

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laterally, therefore appearing broad in lateral view. The transition and following segments have the distal dorsal edge everted, forming a minute sharp tubercle in lateral view, at first subterminal but becoming median on the antepenultimate; the opposing spine is represented by a minute median tubercle only slightly larger than the tubercle on the preceding segment; the terminal claw is slightly longer than the penultimate segment, rather stout, and strongly curved, more so basally than distally.

The radials are even with the edge of the centrodorsal in the median line, but extend up interradially and entirely separate the bases of the IBr_1; the IBr series are widely separated, their sides making nearly a right angle with the sides of the adjacent IBr series. The union of the elements of the IBr series is very close, appearing almost like a syzygy in external view.

The 10 slender arms are from 30 to 39 mm. long; the brachials, which are proportionately long, have strongly produced and overlapping spinous distal ends.

The mouth is marginal and the anal tube subcentral; the anal area is completely covered with small thin calcareous plates.

Locality.—Eig Tor, Gulf of Suez, Red Sea. Eight specimens, collected by Dr. Robert Hartmeyer.

Remarks.—The type material consists of eight specimens. That which was selected as the type-specimen has the arms 30 mm. long; the cirri are IX, 11–13, 5 to 6 mm. long; syzygies occur between the third and fourth brachials, again between the tenth and eleventh or eleventh and twelfth (usually the latter) and fourteenth and fifteenth to seventeenth and eighteenth, and distally at intervals of three (more rarely two) oblique muscular articulations. Another specimen has the arms 33 mm. long, and the cirri VIII, 10, 4.5 mm. long. A third has the arms 39 mm. long, and the cirri XIV, 11–12 (usually the latter) 5 mm. long. A fourth has the cirri IX, 12–13. The remaining four specimens are similar to these.

The type-specimen is in the Berlin Museum.

Subfamily COMACTINIINÆ.

COMATULELLA BRACHIOLATA (Lamarck).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Australia; Herr Preiss; Cat. No. 1048 (Types of *Alecto rosea* J. Müller, 1841).—Two fragmentary specimens.

The centrodorsal is very large and massive, thick-discoidal, with a very slightly convex polar area 7 mm. in diameter; the cirrus sockets are arranged in a single crowded, slightly irregular marginal row.

The cirri are XX–XXII, 32–34, 15 mm. long, rather slender, decreasing slightly in diameter from the base to about the eighth segment, then remaining the same to near the end, the terminal

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portion again tapering slightly; the first segment is very short, the following very gradually increasing in length to the eighth which, with the following, is about twice as broad as long; the penultimate segment is about as long as broad; after the seventh or eighth segment the dorsal profile of the segments becomes very strongly, but evenly, convex, so that in a lateral view the dorsal edge of the cirri appears to be strongly scalloped; the opposing spine is small and blunt, inconspicuous; the terminal claw is small and blunt.

The radials are concealed by the centrodorsal; the IBr_1 are very short, oblong, almost or quite united laterally, united to the IBr_2 by cryptosynarthry, the two ossicles together forming a pentagonal element about twice as broad as long; the IBr_2 are free laterally.

The 10 arms are apparently 60 or 65 mm. long; they are excessively stout in the basal half, the brachials measuring between 3 and 4 mm. in transverse diameter; the dorsal surface of the arms is peculiarly flattened; the first brachial is exceedingly short, forming what appears superficially to be a syzygial pair with the second, this pair being wedge-shaped, about twice as broad as the median length, interiorly united; the third and fourth brachials (syzygial pair) are wedge-shaped, about twice as broad as their inner (greater) length; the following brachials are slightly wedge-shaped, about three times as broad as the median length, gradually becoming triangular, two and one-half or three times as broad as the longer side; the whole arm presents an exceptionally rugged appearance.

P_1 is 13 mm. long, and is composed of 30 segments, of which the first 3 or 4 are broader than long, and the remainder are about as long as broad; none of the segments are carinate; the terminal comb has 11 teeth, which are bluntly triangular, rather narrow basally, about as high as the lateral diameter of the segment that bears them; P_2 is similar but not so long, as stout basally as P_1 but, owing to the lesser length, tapering slightly more rapidly; P_3 is similar, 8.5 mm. long, with 21 segments, almost all of which are broader than long, as stout basally as P_2 but becoming more slender distally; this pinnule bears no comb; the following pinnules are apparently similar to P_3, gradually becoming more slender distally with longer segments, the change taking place first in the distal portion of the pinnules and working toward the base, and slightly decreasing in length. The segments in the proximal part of the pinnules following the third are more or less produced in a thickened convexity dorsally, this dying away in the outer half of the pinnule; this slowly disappears in the distal half of the arm.

The color in spirits is yellow.

2. Southwestern Australia.—Four specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 447.)

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COMATULA PURPUREA (J. Müller).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Australia; Herr Preiss; Cat. No. 1049 (Type of *Alecto purpurea* J. Müller, 1841).—One specimen. (See Proc. Biol. Soc. Washington, vol. 23, p. 95.)

2. Southwestern Australia.—Fourteen specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 451.)

COMATULA PECTINATA (Linnæus).

[For the synonymy, see Vid. Medd. naturh. For. København, 1909, p. 148; and The Crinoids of the Indian Ocean.]

1. Banka Strait; Prof. E. von Martens; Cat. No. 1842.—One small specimen with arms about 70 mm. long.

2. British North Borneo; Herr Pagel; Cat. No. 4744.—One specimen of the slender armed type, with arms 120 mm. long.

3. Malacca; Mr. Hugh Cuming; Cat. No. 1051 (type of *Comatula cumingii* J. Müller, 1849).—One young specimen with arms 35 mm. long; the cirri are VII, all broken off at the base.

COMACTINIA MERIDIONALIS (A. and E. C. Agassiz).

Alecto meridionalis A. and E. C. Agassiz, Seaside Studies, 1865, p. 121.

1. French Reef; United States Coast Survey; Cat. No. 2962.—One specimen.

COMACTINIA ECHINOPTERA (J. Müller).

1. No locality; Captain Wendt.—One medium sized specimen, resembling others in the collection of the United States National Museum from Cuba and from other parts of the West Indies.

Hartlaub [1] states that, according to Carpenter, *Comactinia echinoptera* is identical with the "10-armed variety" of *Neocomatella alata*.

The genus *Comactinia* is very closely allied to the genera *Comatula* and *Cominia*, which it represents in the West Indian region. In his discussion of the genus *Comatula* (the "Solaris" and "Paucicirra Groups" of *Actinometra*) Carpenter placed the most weight upon the presence of syzygies between the ossicles of the IBr series, this character separating it sharply from the West Indian *Comactinia* (the "Echinoptera Group"). This supposed syzygy, however, is not a syzygy at all, but in reality a peculiar modification of the ordinary articulation occurring in that position, not in any way comparable to the true syzygy.[2] Moreover, it is not always developed, even in a given species; for instance, some individuals of *Comatula pectinata* have it and many do not. It affords, therefore, no basis whatever for the differentiation of the genera *Comatula* and *Comactinia*, or

[1] Die Comatulidenfauna des Indischen Archipels, p. 106.

[2] Proc. Biol. Soc. Washington, vol. 22, p. 173.

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for the differentiation of the "Solaris" and "Echinoptera Groups." *Comatula* and *Comactinia*, together with a few other similar genera, are sharply distinguished from all the other genera of the family Comasteridæ by certain peculiarities of the cirri and of the genital pinnules, and have therefore been grouped together into the subfamily Comactiniinæ.[1]

The genus *Neocomatella* is very closely related to the genus *Comatella*, which it replaces in the West Indian region. Both have a very curious type of arm division, which is closely akin to that found in the genera *Nemaster* and *Capillaster*, and quite different from that of any other type. All of these show, in the structure of their cirri and pinnules, a close relationship to such of the 10-armed comasterids as possess dorsal spines on the outer cirrus segments, and for that reason have been united with them in the subfamily Capillasterinæ.[1] No species at all closely related to *Neocomatella alata* is known which possesses only 10 arms, nor is that species ever found in a 10-armed condition. There are, however, many 10-armed species, especially in the West Indies, belonging to the allied genera, but all of them are sharply differentiated from the species of *Comactinia* by the presence of dorsal spines on the outer cirrus segments, as well as by the much longer and narrower segments of the genital pinnules.

It is difficult to see how Carpenter could have supposed that *Comactinia echinoptera*, belonging to the subfamily Comactiniinæ, is merely a 10-armed form of *Neocomatella alata*, belonging to the subfamily Capillasterinæ.

Subfamily COMASTERINÆ.

COMASTER TYPICA (Lovén).

[For the synonymy, see Vid. Medd. Naturh. For. København, 1909, p. 139.]

1. North of Port Walcott, Western Australia; 50 fathoms; *Gazelle*.—One specimen. (See Zool. Anzeiger, vol. 34, No. 11/12, p. 365.)

2. Southwestern Australia.—Five specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 453.)

COMANTHERIA BRIAREUS (Bell).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. North of Port Walcott, Western Australia; 50 fathoms; *Gazelle*.—One specimen. (See Zool. Anzeiger, vol. 34, No. 11/12, p. 365.)

2. Southwestern Australia.—Two specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 454.)

COMANTHINA BELLI (P. H. Carpenter).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Mermaid, northwestern Australia; *Gazelle;* Cat. No. 2157.—Arm fragments; the extravagant dorsal processes on the third, fourth, and

[1] See Proc. Biol. Soc. Washington, vol. 22, p. 175.

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fifth, and to a lesser degree on the sixth, pinnule segments prove conclusively that these fragments must belong to this species. They agree very closely with corresponding parts of the arms in a fine specimen at hand from Torres Strait.

2. Southwestern Australia.—Two specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 455.)

COMANTHINA SCHLEGELII (P. H. Carpenter).

[For the synonymy, see Notes from the Leyden Museum, vol. 33, p. 179.]

1. Amboina; Dr. J. Brock; Cat. No. 5286.—One fine specimen; two fully developed and several rudimentary cirri remain. This specimen has already been recorded by Hartlaub, under the name of *Actinometra regalis*. (See Die Comatulidenfauna des Indischen Archipels, p. 99.)

COMANTHUS BENNETTI (J. Müller).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. South Seas; Dr. O. Finsch; Cat. No. 5350.—One fine specimen with about 70 arms about 160 mm. long.

2. St. Mathias Island; Herr H. Schöde.—Five specimens, all rather small, with about 60 arms. The distal cirrus segments are laterally flattened and about twice as broad as long, but perfectly smooth dorsally. One of the specimens is unusual in having several of the division series of 2 instead of the usual 4 (3+4).

COMANTHUS SAMOANA A. H. Clark.

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Samoa; Museum Godeffroy; Cat. No. 1659.—One specimen with 26 arms about 100 mm. long; three of the IIBr series are 2, and seven are 4 (3+4).

2. No locality; Cat. No. 4134.—One specimen with 31 arms about 80 mm. long.

COMANTHUS TRICHOPTERA (J. Muller).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Southwestern Australia.—Two specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 456.)

COMANTHUS WAHLBERGII (J. Müller).

[For the synonymy, see Proc. U. S. Nat. Mus., vol. 40, p. 17.]

1. Port Natal; Herr Wahlberg; Cat. No. 1060.—Two specimens; one of these has 20 arms, all the IIBr series being present, and all 4(3+4); the arms are 45 mm. long; the cirri are XIII, 15–16 (usually the latter), 10 mm. long; in all cases the fifth is a transition segment; the first segment is very short, the following increasing in length so that the fifth is twice as long as its proximal diameter; the sixth is nearly as long; the eighth or ninth and following are slightly broader than long; the transition and following segments

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have slightly everted distal dorsal edges, which appear as minute sharp subterminal tubercles in lateral view, on the last few segments becoming a submedian transverse ridge, not resolving into a spine; the opposing spine is blunt, forked, or represented by a short transverse ridge. The dorsal pole of the centrodorsal is flat, rather large, 2.5 mm. in diameter. The other specimen is similar.

These are part of Müller's type material; his other specimens are at Stockholm.

COMANTHUS ANNULATA (Bell).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Friedrich-Wilhelms-Haven, New Guinea; Herr H. Schöde.—One large specimen with 40 arms.

2. St. Mathias Island; Herr H. Schöde.—Three specimens, each with about 40 arms; as in the preceding the centrodorsal is much reduced; all three have nearly all of the division series 2 instead of 4(3+4).

3. Batjan; Prof. E. von Martens; Cat. No. 1351.—One specimen with 41 arms about 100 mm. long; three cirri remain.

4. Western Australia.—Five specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 457.)

COMANTHUS PARVICIRRA (J. Müller).

[For the synonymy, see Proc. U. S. Nat. Mus., vol. 40, p. 18.]

1. Amoy, China; Cat. No. 5352.—Five specimens; one has 15 arms about 80 mm. long, three have 12 arms, 95 mm., 90 mm., and 45 mm. long, respectively, and the fifth has 10 arms 35 mm. long.

2. Ovalao, Fiji; Herr Arkona; Cat. No. 2405.—One specimen.

3. Amboina; Dr. J. Brock; Cat. No. 5248.—One specimen with 28 arms about 100 mm. long; six of the IIBr series are 2, and four are 4(3+4); five of the IIIBr series are 2, and three are 4(3+4); only small rudimentary cirri remain. This specimen has already been recorded by Hartlaub. (See Die Comatulidenfauna des Indischen Archipels, p. 97.)

4. Friedrich-Wilhelms-Haven, New Guinea; Herr H. Schöde.—Three specimens; two are of medium size with about 20 arms, and one is rather larger with about 27 arms; all three have a few cirri remaining.

5. Atapupu, Timor; Prof. E. von Martens; Cat. No. 1647.—Two specimens, one with one, the other with no cirri; both have about 20 arms; one has four IIBr series in place, three 2, and one 4(3+4); the other has five in place, two 2, and three 4(3+4).

6. Batjan; Prof. E. von Martens; Cat. No. 1351.—One specimen with 41 arms about 100 mm. long; three cirri remain.

7. No locality.—Two specimens.

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Family ZYGOMETRIDÆ.

ZYGOMETRA MICRODISCUS (Bell).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Western Australia.—Two specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 458.)

2. Mermaid, northwestern Australia.—One specimen. (See Zool. Anzeiger, vol. 34, No. 11/12, p. 367.)

ZYGOMETRA ELEGANS (Bell).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Western Australia.—One specimen. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 458.)

2. Mermaid, northwestern Australia.—Four specimens. (See Zool. Anzeiger, vol. 34, No. 11/12, p. 367.)

Family HIMEROMETRIDÆ.

AMPHIMETRA AFRICANA A. H. Clark.

Amphimetra africana A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 20.

1. Bagamoyo, German East Africa; Cat. No. 4616.—Five specimens; one of these served as the type of the species;[1] the other four are very young with arms about 20 mm. long and cirri about 6 mm. long; two have 10 and two 11 arms.

This species appears to be nearest to *A. philiberti* of the East Indies, but it is a smaller, more slender and less rugged form with fewer arms and much longer cirrus spines.

AMPHIMETRA DISCOIDEA A. H. Clark.

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Western Australia.—One specimen. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 459.)

CRASPEDOMETRA ATER A. H. Clark.

Alecto savignii (part) J. MÜLLER, Monatsb. k. preuss. Akad. Wiss., 1841, p. 185; Archiv Naturg., 1841, vol. 1, p. 144.

Craspedometra ater A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 21.

1. Red Sea; Hempricht and Ehrenberg; Cat. No. 1055.—One specimen, the type of the species. (See Proc. U. S. Nat. Mus., vol. 40, p. 21.)

CRASPEDOMETRA MADAGASCARENSIS A. H. Clark.

Craspedometra madagascarensis A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 23.

1. Madagascar; Doctor Voeltzkow; Cat. No. 5348.—Three specimens; one of these, the type of the species, has already been described

[1] See Proc. U. S. Nat. Mus., vol. 40, p. 20.

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in detail;[1] one of the other specimens has 18 arms about 90 mm. long; six IIBr series are present, five 4(3+4) and one 2; one of the IIBr 4(3+4) series bears internally a IIIBr series; the IIBr 2 series bears a IIIBr 4(3+4) series externally. The color of this specimen is purple. The third example has 13 arms 65 mm. long, the three IIBr series being 4(3+4); the cirri are XVI, 32–33, 20 mm. long; the color is brownish white, the cirri light purple.

This species is easily distinguished from *Amphimetra africana* by the tapering cirri which bear shorter dorsal spines, by the much more slender lower pinnules, and by the longer wedge-shaped brachials.

HIMEROMETRA MAGNIPINNA A. H. Clark.

Himerometra magnipinna A. H. CLARK, Smiths. Misc. Coll. (Quarterly Issue), vol. 52, 1908, p. 214.

1. St. Mathias Island; Herr H. Schöde.—One fine specimen.

HIMEROMETRA CRASSIPINNA (Hartlaub).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. British North Borneo; Herr Pagel; Cat. No. 4744.—One specimen, resembling others at hand from Singapore, though the proximal cirrus segments are a trifle shorter.

2. Singapore; Prof. E. von Martens; Cat. No. 5373.—One specimen, which served Doctor Hartlaub as the type of his *Antedon martensi*. (See Die Comatulidenfauna des Indischen Archipels, p. 21, pl. 1, figs. 3 and 6.)

This is a rather small and badly broken specimen, but it agrees in every particular with numerous specimens of *H. crassipinna* from Singapore at hand belonging to the Copenhagen Museum. (See Vidensk. Medd. fra den Naturhist. Forening i København, 1909, p. 155.)

HETEROMETRA SAVIGNII (J. Müller).

[For the synonymy, see Proc. U. S. Nat. Mus., vol. 40, p. 24.]

1. Red Sea; Hempricht and Ehrenberg; Cat. No. 1056.—One specimen, which was a part of Müller's type material. The centrodorsal is discoidal, moderately thick, with a flat dorsal pole 3 mm. in diameter; the cirrus sockets are arranged in two and a partial third alternating marginal rows.

The cirri are about 20 mm. long with from 23 to 25 segments, but the best developed cirri are all broken off; long and prominent dorsal spines are developed from the twelfth segment onward.

[1] See Proc. U. S. Nat. Mus., vol. 40, p. 23.

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No basal rays are visible; the radials are even with the edge of the centrodorsal in the median line, slightly visible as low triangles in the interradial angles; the IBr_1 are slightly over three times as broad as long, the lateral edges nearly straight, parallel, united in the proximal half but separated in the distal half by a moderately broad U-shaped gap; the IBr_2 are broadly pentagonal, twice as broad as long; the division series are well rounded dorsally and well separated laterally, the sides being perfectly smooth, with no trace of lateral production.

There are 20 arms 125 mm. long; all the IIBr series are present, and all are 4(3+4).

The lower pinnules are very long, but slender and perfectly smooth; the arms are perfectly smooth dorsally.

2. No locality; Cat. No. 5371.—One specimen. The cirri are XXXVI, 30, 24 mm. long; long and prominent dorsal spines are developed from the eighteenth segment onward.

There are 20 arms, all the IIBr series being present, and all are 4(3+4).

P_1 is 9 mm. long, tapering rather rapidly in the first 4 segments and becoming very slender and flagellate distally. P_2 is about 13 mm. long and resembles P_3; P_3 is 14 mm. long with 21 segments of which the first is twice as broad as long, the following gradually increasing in length and becoming about as long as broad on the fourth and about twice as long as broad in the distal portion; the pinnule is slender, tapering evenly to a delicate tip, and is perfectly smooth with no trace of proximal carination or of a supplementary ridge such as is seen on the large proximal pinnules in the majority of the species of the genus; the segments fit closely end to end, without any cutting away of the corners; P_4 is 6 mm. long with 12 segments, a little less stout basally than P_3, but tapering more rapidly; the outer segments are twice as long as broad; P_5 is 5 mm. long, proportionately smaller than P_4, with slightly shorter segments.

3. Red Sea; Hempricht and Ehrenberg; Cat. No. 1054.—Two specimens, similar to those described; both have 20 arms, all the IIBr series being present, all 4(3+4).

4. Tor, Red Sea (Museum für Meereskunde).—One specimen.

The chief characteristics of this species are the strongly rounded and well-separated rays and division series, which do not have produced margins; the very long and slender, perfectly smooth and evenly tapering P_2 and P_3; and the long spines on the outer cirrus segments. The whole animal has a strikingly smooth appearance. All the specimens have exactly 20 arms, all the IIBr series being present, all 4(3+4). The color of all the specimens is dark brown.

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Family STEPHANOMETRIDÆ.

STEPHANOMETRA TUBERCULATA (P. H. Carpenter).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. New Guinea; Cat. No. 5347.—One specimen with 15 arms about 60 mm. long; one IIIBr series is developed (externally); P_2 is 9 mm. long with 10 greatly elongated segments; P_3 is similar to it, but smaller, 6 mm. long, with 8 segments; P_4 has 8 segments of which the outer resemble those of the preceding pinnules; it is 4 mm. long and slightly stiffened; P_2 and P_3 are comparatively slender, possibly because of the small size of the animal.

2. No locality; Cat. No. 5287.—One large specimen with 33 arms 100 mm. long.

The cirri are XXXV, 18–25 (usually the latter), 15 to 25 mm. long (the latter the length of the peripheral cirri); the first two segments are very short, the following gradually increasing in length so that the fourth or fifth is about as long as broad; the following are about as long as broad or slightly longer than broad, after the middle of the cirrus gradually becoming shorter so that the segments in the outer third are slightly broader than long; the short distal segments are strongly compressed laterally and bear a faint median dorsal carination; there are no dorsal spines; the opposing spine is prominent, subterminal, directed obliquely forward; the terminal claw is slightly longer than the penultimate segment, stout, rather strongly curved.

The sides of the ossicles of the division series and of the first two brachials are produced into prominent flangelike borders which, however, are comparatively narrow.

P_1 is 10 mm. long, slender and flagellate, with 20 segments of which the first is twice as broad as long, the third about as long as broad, and the following gradually increase in length so that the distal are three times as long as broad; P_2 is stout and very stiff, 13.5 mm. long with 14 segments of which the first is twice as broad as long, the third somewhat longer than broad, the fourth half again as long as broad, the fifth twice as long as broad, and the remainder nearly three times as long as broad; P_3 is 9 mm. long with 10 segments, similar to P_2, but with the segments proportionately more elongated; P_4 is small, slender and weak, 4.5 mm. long with 11 segments.

3. No locality; Cat. No. 5288.—One specimen.

The centrodorsal is low hemispherical, about 5 mm. in diameter at the base, the dorsal pole 1.5 mm. in diameter, approximately flat, studded with small deep pits representing obsolete cirrus sockets.

The cirri are XXVII, 21–22, 20 to 25 mm. long, arranged in two and a partial third closely crowded alternating marginal rows; the

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longer proximal segments are half again as long as their proximal diameter, and have a slightly concave ventral profile so that their ends are prominent; the 10 outer segments are about as long as broad, and the distal, especially the last three or four, are rather strongly carinate dorsally; the opposing spine is prominent, subterminal; the terminal claw is stout, rather short, and strongly curved.

The 28 arms are about 100 mm. long; all but one of the rays bear external IIIBr series; the exception to this regular order has the IIBr and the IIIBr series missing on one side.

P_1 is slender and flagellate, 7 mm. long with about 17 segments; P_2 is stiff and spine-like, 12 mm. long with 11 segments; P_3 is 10.5 to 11 mm. long with 10 segments, very slightly more slender than P_2; P_4 is 7.5 to 8 mm. long with 9 or 10 segments, much smaller than P_3 though more or less like it distally; P_5 is 4.5 to 5 mm. long with 10 segments, slender and weak; the following pinnules are short and soft with short segments.

STEPHANOMETRA TENUIPINNA (Hartlaub).

Antedon tenuipinna HARTLAUB, Nachr. Ges. Göttingen, Mai, 1890, p. 178.

1. New Britain; Dr. O. Finsch; Cat. No. 5374.—One specimen, the type of the species. (See Die Comatulidenfauna des Indischen Archipels, p. 54, pl. 3, figs. 28, 30, and 34.)

Family PONTIOMETRIDÆ.

PONTIOMETRA ANDERSONI (P. H. Carpenter).

[For the synonymy, see Vid. Medd. Naturh. For. København, 1909, p. 165.]

1. Singapore; Prof. E. von Martens; Cat. Nos. 5351 and 5372.—Two cirri and a detached visceral mass.

Family MARIAMETRIDÆ.

SELENEMETRA FINSCHII (Hartlaub).

Antedon finschii HARTLAUB, Nachr. Ges. Göttingen, Mai, 1890, p. 176.

1. New Britain; Dr. O. Finsch; Cat. No. 2602.—Two specimens, the types of the species. (See Die Comatulidenfauna des Indischen Archipels, p. 47, pl. 3, fig. 32.)

DICHROMETRA PROTECTUS (Lütken).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Tonga Islands; Museum Godeffroy; Cat. No. 3047.—Three 40-armed specimens.

2. New Guinea; Cat. No. 2981.—Seventeen medium-sized and small specimens. The largest has 51 arms about 80 mm. long; most of the specimens have about 40 arms.

3. Java; Herr Jagor; Cat. No. 1845.—One small specimen.

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4. Singapore; Herr Jagor; Cat. No. 2456.—One small specimen with 27 arms about 70 mm. long. It is rather poorly preserved so that the large size of the outer pinnules is difficult to appreciate. The outer 10 or 11 cirrus segments have small sharp median tubercles. The very small size of P_1 and the great difference in size between P_2 and the two adjacent pinnules show that this individual belongs to *D. protectus* and not to *D. palmata*, under which name it was recorded by Hartlaub. (See Die Comatulidenfauna des Indischen Archipels, p. 51.)

5. Bougainville Island, Solomon Group; *Gazelle*.—Two specimens. (See Zool. Anzeiger, vol. 34, No. 11/12, p. 367.)

6. Salawatti; *Gazelle*.—Two specimens. (See Zool. Anzeiger, vol. 34, No. 11/12, p. 367.)

7. No locality; Cat. No. 5334.—One specimen.

DICHROMETRA TENERA (Hartlaub).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Western Australia.—Three specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief. 13, p. 460.)

DICHROMETRA FLAGELLATA (J. Müller).

[For the synonymy, see Notes from the Leyden Museum, vol. 33, p. 184.]

1. Singapore; Prof. J. Müller; Cat. No. 1282.—One specimen.

DICHROMETRA PALMATA (J. Müller).

[For the synonymy, see Proc. U. S. Nat. Mus., vol. 40, p. 27.]

1. Um-el-Terman, Gulf of Suez; Dr. R. Hartmeyer; Cat. No. 5604.—One specimen.

The centrodorsal is thick discoidal with a flat dorsal pole 2.5 mm. in diameter; the cirrus sockets are arranged in two irregular closely crowded rows.

The cirri are XIV, 24–25 (usually the former), 20 mm. long; the longer proximal segments are about one-third longer than broad; the outer 8 or 10 segments are slightly broader than long and bear a well-marked median dorsal keel which on the outermost shortens into a small tubercle.

There are 30 arms 115 mm. long; the division series are well rounded dorsally and well separated laterally; the arms are perfectly smooth dorsally.

P_1 is 13 mm. long with 28 segments; it tapers rather rapidly for the first four segments, then becoming more slender and tapering gradually to the tip; the first segment is about twice as broad as long, the following gradually increasing in length so that the fourth is about as long as broad, the segments beyond the seventh about one-third again as long as broad, and the terminal half again as long as broad; the first three segments have their distal angles slightly cut away, but

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this feature is absent from those following. P_2 is 14 mm. or 15 mm. long with 30 segments, slightly stouter and stiffer than P_1 and tapering more evenly from the base, though otherwise exactly resembling it. P_3 is 11 mm. long with 23 segments of which the distal, as in P_2, are about twice as long as broad; the pinnule is about as stout basally as P_1, but tapers very evenly and gradually; it is considerably more slender than P_2. P_4 is 6.5 mm. long with 17 segments, and is essentially like P_3. P_5 is 5.5 mm. long with 16 segments, and resembles P_4. The following pinnules resemble P_5, later becoming longer and more slender. The distal pinnules are 8 to 9 mm. long, very slender, with from 19 to 21 segments.

This specimen is dull flesh color with broad bands of black on the arms; the dorsal half of the cirri is dull flesh color, the ventral half black.

2. Red Sea; Herr Umlauff; Cat. No. 2019.—One specimen with 30 arms 135 mm. long.

The centrodorsal is thick discoidal with slightly sloping sides, the dorsal pole flat, 4 mm. in diameter; the cirrus sockets are arranged in three closely crowded marginal rows.

The cirri are from 17 to 20 mm. long and are composed of 24 or 25 segments, of which the outer are carinate; the longer proximal segments are slightly longer than broad, the short distal segments being slightly broader than long.

3. Red Sea; Hempricht and Ehrenberg; Cat. No. 2454.—One small badly broken specimen.

4. Ras-el-Millan, Red Sea; Dr. R. Hartmeyer; Cat. No. 5602.—One specimen with 24 arms 90 mm. long, resembling the one described in detail. As is always the case in this species, the IIIBr series are externally developed.

5. Red Sea; Hempricht and Ehrenberg; Cat. No. 1059.—One specimen with 30 arms 110 mm. long.

6. Red Sea; Hempricht and Ehrenberg; Cat. No. 1057.—One specimen with 30 arms, similar to the preceding.

7. Dar-es-Salam, Red Sea; Cat. No. 4169.—Fragments.

8. No locality.—Two specimens.

Hartlaub's *Antedon klunzingeri* [1] is identical with this species.

Family COLOBOMETRIDÆ.

CENOMETRA EMENDATRIX (Bell).

[For the synonymy, see Proc. U. S. Nat. Mus., vol. 40, p. 28.]

1. Mauritius; Prof. K. Möbius; Cat. No. 5349.—One almost perfect specimen. (For a detailed description of this specimen, see Proc. U. S. Nat. Mus., vol. 40, p. 28.)

[1] Die Comatulidenfauna des Indischen Archipels, p. 46, pl. 2, figs. 22 and 25.

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CYLLOMETRA ALBOPURPUREA A. H. Clark.

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Japan; Dr. F. Hilgendorf; Cat. No. 2829.—Detached arms.

DECAMETRA INFORMIS (P. H. Carpenter).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Singapore; Prof. E. von Martens; Cat. No. 5353.—One small specimen with arms about 20 mm. long. In this small specimen P_2 is composed of longer segments than in the fully grown, and P_3 is proportionately shorter. The number of segments in P_3, however, and their overlapping and spinous distal edges agree with *D. informis*, of which this appears to be the young.

DECAMETRA STUDERI (A. H. Clark).

[For the synonymy, see The Crinoids of the Indian Ocean.]

1. Dirk Hartog Island, Western Australia, 7 fathoms; *Gazelle*.—One specimen. (See Zool. Anzeiger, vol. 34, No. 11/12, p. 368.)

DECAMETRA MODICA A. H. Clark.

Decametra modica A. H. Clark, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 32.

1. Bagamoyo, German East Africa; Cat. No. 4616.—Three specimens. (See Proc. U. S. Nat. Mus., vol. 40, p. 32.)

DECAMETRA MÖBIUSI A. H. Clark.

Decametra möbiusi A. H. Clark, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 31.

1. Mauritius; Prof. K. Möbius; Cat. No. 5349.—One specimen. (See Proc. U. S. Nat. Mus., vol. 40, p. 31.)

OLIGOMETRA JAPONICA (Hartlaub).

Antedon japonica Hartlaub, Nachr. Ges. Göttingen, Mai 1890, p. 172.

1. Japan; Dr. F. Hilgendorf; Cat. No. 5606.—One specimen.

The cirri are XXI, 21–23 (usually nearer the latter), 11 mm. long; the cirrus segments are subequal, the outer slightly broader than long; on the sixth a subterminal transverse ridge appears which becomes median on the last one or two before the penultimate; this transverse ridge is very low and inconspicuous, most conspicuous on the last two or three segments, where it is very narrow and may become reduced to a small tubercle; the opposing spine is subterminal, and leans slightly anteriorly; it reaches in height about one-third of the distal diameter of the penultimate segment. (For a detailed description of this specimen, see Die Comatulidenfauna des Indischen Archipels, p. 84, pl. 5, fig. 49.)

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OLIGOMETRA SERRIPINNA OCCIDENTALIS A. H. Clark.

Oligometra serripinna var. *occidentalis* A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 33.

1. Fouquet Island, near Mauritius; Prof. K. Möbius.—One small specimen. (See Proc. U. S. Nat. Mus., vol. 40, p. 33.)

2. Bagamoyo, German East Africa.—One specimen.

COLOBOMETRA VEPRETUM A. H. Clark.

Colobometra vepretum A. H. CLARK, Vid. Medd. Naturh. For. København, 1909, p. 174.

1. Singapore; Prof. E. von Martens; Cat. No. 5351.—One arm fragment.

Family TROPIOMETRIDÆ.

TROPIOMETRA AUDOUINI, new species.

Tropiometra encrinus (part) A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 36.

1. Eig Tor, Gulf of Suez; Dr. R. Hartmeyer; Cat. No. 5601.—One specimen.

Centrodorsal thick discoidal witn a single marginal row of cirrus sockets.

Cirri XVI, 18 (only one remaining), 13 mm. long; the outer cirrus segments are about half again as broad as long.

The arms are about 80 mm. long; the carination on the brachials is moderately developed.

The lower pinnules are very stiff, especially P_2, P_3 and P_4; P_1 is 7 mm. long with 16 segments; P_2 is 7 mm. long with 14 segments, stouter basally than P_1; P_3 is 6.5 mm. long with 16 segments; P_4 is 6 mm. long with 16 segments; P_2, P_3 and P_4 sometimes have spinelike tips resembling those of the proximal pinnules of the species of *Stephanometra*, and are very stiff; P_1 is also more or less stiffened; P_5 is 6.5 mm. long with 20 segments, slender, delicate, and distally flagellate, not stiffened like the preceding; P_6 resembles P_5; the distal pinnules are very slender.

2. Ras-el-Millan, Gulf of Suez; Dr. R. Hartmeyer; Cat. No. 5603.—One specimen, smaller than the preceding; the arms are about 50 mm. long; the cirri are XXIII, 16–17, 13 mm. long. Many of the cirri are small, from 9 mm. long with 14 segments upward; these all appear to be juvenile cirri which will be lost before maturity is reached. The lower pinnules have the same sharp tips as those in the preceding example.

3. Aden; Prof. J. Müller; Cat. No. 1050.—One rather small specimen.

This new species is nearest to *T. indica* from Ceylon, from which it differs in having fewer cirri composed of fewer segments, and less

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stiffened lower pinnules. In *T. indica* the cirri are XIX–XXIX (usually XXVI–XXIX), 20–26 (usually 23–26), 15 to 22 mm. (usually 20 to 22 mm.) long; the outer cirrus segments are half again as broad as long up to the fourth from the end of the cirrus; the antepenultimate segment is about as long as broad; the last four segments taper rather rapidly as usual. The cirri in *T. indica* are arranged in two or three (usually two and a partial third) marginal rows instead of in a single row, as in *T. audouini*.

The brachial carination in this species differs from that in *T. indica* in being broader, more rounded, and less sharp, and it is also fringed with coarser spines on its distal border.

Of *T. indica* 48 specimens have been examined, all from Ceylon or adjacent parts of India.

T. encrinus, with which I have previously confused both of these species, has much larger cirri, which resemble those of the American *T. picta* in having comparatively long instead of short segments in the distal portion.

TROPIOMETRA ENCRINUS A. H. Clark.

Tropiometra encrinus A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 36.

1. Eastern Asia; Cat. No. 5336.—One specimen, the type of the species.

The cirri are large and stout, XXIII, 20–23 (usually nearer the latter), 20 to 25 mm. long; in the proportion of the component segments the cirri resembles those of *T. picta*. (See Proc. U. S. Nat. Mus., vol. 40, p. 36.)

2. Indian Ocean; Cat. No. 5335.—One specimen, much broken. The centrodorsal and calyx have been laid open, showing beautifully the relationships of the dorsal cavities of the calyx.

A specimen of this species in the collection of the Indian Museum labeled "?India" has the cirri XX, 23–25, 20 to 25 mm. long, resembling those of the type.

TROPIOMETRA PICTA (Gay).

Tropiometra picta A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 35; Bull. mus. hist. nat. Paris, No. 4, 1911, p. 13 (255).

1. Santa Catarina Island, Brazil; Cat. No. 2875.—Two specimens.

The larger of these has the cirri XXV, 23–25, 20 to 25 mm. long; the smaller has the cirri XIX, 20, 15 mm. long.

2. Rio de Janeiro; Selenka; Cat. Nos. 1826 and 2690.—Thirty-nine specimens.

The details of the cirri of nine of these specimens are:

(1) XXII, 21–23 (usually 22 or 23), 24 to 28 mm. long.

(2) XX, 20–21, 17 mm. long.

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(3) XVII, 22–24, 23 to 25 mm. long (a very large specimen.)
(4) XIX, 19–22, 20 mm. long.
(5) XX, 20–23.
(6) XXIV, 21, 17 to 20 mm. long.
(7) XIX, 21–25 (usually about 23), 20 mm. long.
(8) XXII, 21–24, 20 to 22 mm. long.
(9) XXII, 21–23, 20 to 23 mm. long.

One of the specimens is interesting in possessing 11 arms, one IIBr 2 series being developed. This is the first time that the presence of IIBr series has been detected in this genus, though *T. picta* not infrequently has 12 arms through the presence of an additional ray. (See Bull. Mus. Comp. Zoöl., vol. 51, No. 8, p. 244, pl. 2.)

TROPIOMETRA CARINATA (Lamarck).

[For the synonymy, see Proc. U. S. Nat. Mus., vol. 40, p. 34.]

1. Madagascar; Doctor Hildebrandt; Cat. No. 2546.—One specimen, labeled "*Actinometra solaris.*"

2. Mauritius; M. Guérin-Ménéville; Cat. No. 1038.—One specimen; the cirri are XIX, 21–23 (usually 22 or 23), 15 mm. long; the carination on the arms is very greatly developed as in certain specimens of *T. picta* from Rio de Janeiro, each carinate process bearing a tuft of small spines. The color is purple.

3. Mauritius; Cat. No. 1037.—One specimen; the cirri are XXII, 23–26, 20 mm. long; the arms are about 80 mm. long; the color is white, faintly blotched with light brown.

4. Fouquet Reef, Mauritius; Prof. K. Möbius; Cat. No. 5349.—Twenty-six specimens. Details of six of the largest and most typical are:

(1) Cirri XV, 20–23 (usually the latter), 20 mm. long; the dorsal pole of the centrodorsal is flat, 5 mm. in diameter; the arms are very strongly carinate; the color is plain dark purple.

(2) Cirri XXIII, 21–24 (usually 22 or 23), 20 mm. long; the dorsal pole of the centrodorsal is flat, 4 mm. in diameter.

(3) Cirri XXVI, 21–25 (usually 23 or 24), 20 mm. long; the arms are strongly carinate.

(4) Cirri XX, 22–24 (usually 23), 15 to 20 mm. long; the arms are about 100 mm. long.

(5) Cirri XX, 23–25 (usually 23), 15 to 20 mm. long; the dorsal pole of the centrodorsal is flat, 7 mm. in diameter.

(6) Cirri XIX, 22–23, 15 to 20 mm. long.

In these specimens the carination of the brachials is usually prominent. The color is usually plain purple, but some specimens have narrow yellow bands in the distal part of the arms.

5. Zanzibar; Count von der Decken; Cat. No. 1636.—One specimen.

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Family THALASSOMETRIDÆ.

PTILOMETRA MACRONEMA (J. Müller).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Southwestern Australia.—Nine specimens.
2. Dirk Hartog I., Western Australia; 7 fathoms.—One specimen.

COSMIOMETRA CONIFERA (Hartlaub).

Antedon conifera HARTLAUB, Nachr. Ges. Göttingen, Mai, 1890, p. 173.

1. Japan; Dr. F. Hilgendorf; Cat. No. 2830.—One badly broken specimen. (See Die Comatulidenfauna des Indischen Archipels, p. 76, pl. 4, fig. 46; pl. 5, figs. 51 and 56.)

Family ANTEDONIDÆ.

Subfamily ANTEDONINÆ.

ANTEDON PETASUS (Düben and Koren).

Alecto petasus DÜBEN and KOREN, K. Vetensk. Akad. Handl., 1844 (1846), p. 229, pl. 6, fig. 1.

1. Trondhjem; Larsen; Cat. No. 2887.—One specimen.
2. Florø; Prof. M. Sars; Cat. No. 1043.—One arm fragment.
3. Bodøfjord; Blochmann; Cat. No. 3618.—One specimen.
4. Bohuslän; Malm; Cat. No. 1308.—One specimen.
5. Norway; Cat. No. 1039.—Four specimens.

ANTEDON MEDITERRANEA (Lamarck).

[For the synonymy, see Notes from the Leyden Museum, vol. 33, p. 191.]

1. Naples; Zoölogical Station; Cat. Nos. 2351, 2352 and 2378.—Two specimens, and larvæ.
2. Rovigno; Professor Möbius; Cat. No. 3547.—One specimen.
3. Sicily; Schultz; Cat. Nos. 3353 and 5339.—Twelve specimens; the cirri are from 18 to 21 mm. long with from 19 to 25 segments.
4. Mediterranean; Peters; Cat. No. 5341.—Seven specimens; the arm length is from 50 to 60 mm.; the cirri of the larger are 15 mm. long with 21 or 22 segments.
5. Mediterranean; Cat. No. 1040.—One specimen with arms 85 mm. long.
6. No locality; Cat. Nos. 1041, 1042, 5338, and 5340.—Eight specimens.

ANTEDON ADRIATICA A. H. Clark.

Antedon adriatica A. H. CLARK, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 329.

1. Trieste; Prof. J. Müller; Cat. No. 5342.—Seventy-one specimens; the larger have an arm length of about 100 mm.; the cirri are XXII–XXVI, 24–29 (usually 26–28) 20 mm. long; P_1 is 12 mm. long with 17 segments; P_2 is 7 mm. long with 12 segments.

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2. Trieste; Dr. O. Hamann.—Seven specimens; the larger have an arm length of 110 mm.; the cirri have from 21 to 27 segments (usually about 27) and are from 16 to 20 mm. (usually from 18 to 20 mm.) long.

(For the original description of this species, based in part upon these specimens, see Proc. U. S. Nat. Mus., vol. 38, pp. 329–333.)

COMPSOMETRA INCOMMODA (Bell).

[For the synonymy, see The Recent Crinoids of Australia.]

1. Southwestern Australia.—Two specimens. (See Die Fauna Südwest-Australiens, vol. 3, Lief 13, p. 464.)

IRIDOMETRA MAURITIANA A. H. Clark.

Iridometra mauritiana A. H. CLARK, Proc. U. S. Nat. Mus., vol. 40, 1911, p. 40.

1. Fouquet, Mauritius; Prof. K. Möbius; Cat. No. 5349.—Thirty-four specimens, including the type.

This species differs from *I. nana*, to which it appears to be most closely related, in having much stouter cirri, of which the component segments are much less constricted centrally; also P_1 is considerably larger than P_2, and is stiffened.

Subfamily ZENOMETRINÆ.

LEPTOMETRA PHALANGIUM (J. Müller).

[For the synonymy, see Proc. U. S. Nat. Mus., vol. 40, p. 44.]

1. Nice; Doctor Peters; Cat. No. 1044.—Four specimens.
2. Naples; Cat. No. 2377.—One specimen.
3. Sicily; Cat. No. 5343.—Seven specimens; these have their rays in close lateral contact.
4. No locality; Cat. No. 1045.—Three small broken specimens.

Subfamily HELIOMETRINÆ.

HELIOMETRA GLACIALIS (Leach).

[For the synonymy, see Vid. Medd. Naturh. For. Kjøbenhavn, 1909, p. 188.]

1. Kara Sea; *Dijmphna;* Cat. No. 3193.—One medium-sized specimen.
2. East Spitzbergen; Prof. W. Kükenthal; Cat. No. 3683.—One medium-sized specimen.
3. Belsund, west Spitzbergen; Leche; Cat. No. 3855.—One specimen.
4. Belsund, west Spitzbergen (Station No. 10); Römer and Schaudinn; Cat. No. 4413.—One specimen.
5. Spitzbergen (Stations Nos. 3, 6, 9, 10, 13, 24, 25, 32, 33, 34, 36, 37, 38, 49); Römer and Schaudinn.—Numerous specimens.
6. Greenland; Prof. J. Müller; Cat. No. 1046.—One specimen.
7. No locality; Cat. No. 5344.—Two medium-sized specimens.

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Carpenter's (*Antedon*) *quadrata* is a synonym of this species.

Very small specimens of this form have P_3 more like P_4 than like P_2, and the borders, sometimes also the dorsal surface, of the ossicles of the IBr series and lower brachials are prominently spinous; with increasing size the spinosity gradually disappears, and P_3 gradually comes to resemble P_2 instead of P_4.

HATHROMETRA PROLIXA (Sladen).

1. Spitzbergen; Römer and Schaudinn; Cat. No. 4391.—One specimen with arms 120 mm. long; the longest cirri are 45 mm. long with 38 segments; the apical cirri are 15 mm. long with 22 segments which are proportionately shorter and more "dice-box shaped" than those of the peripheral cirri.

2. Spitzbergen; Römer and Schaudinn.—One specimen with an arm length of about 100 mm.; P_1 is 17 mm. long with 31 segments, P_2 is 7 mm. long; the distal pinnules are 16 mm. long. The cirrus segments appear to be a trifle shorter than usual.

3. Spitzbergen; Römer and Schaudinn; Cat. No. 4386.—One specimen.

4. Spitzbergen; Römer and Schaudinn; Cat. No. 4387.—Two specimens.

5. Spitzbergen; Römer and Schaudinn; Cat. Nos. 4389 and 4390.—Two small specimens.

6. Spitzbergen (Stations Nos. 36, 37, 39); Römer and Schaudinn.—Numerous specimens.

7. North Atlantic Ocean; Norwegian North Atlantic Expedition.—Two specimens with an arm length of about 90 mm.

The species of the genus *Hathrometra* are among the most difficult of the recent crinoids to determine on account of their excessive fragility. The chief differential characters are found in the cirri; but these are commonly, one might almost say usually, lost. Moreover the cirri of each individual are very variable in size, those about the periphery of the centrodorsal being twice as long as those about the dorsal pole, or even longer, and all possible gradations occurring. Only the peripheral cirri are of value in specific determination so that, unless these are preserved, identification becomes a matter of the very greatest difficulty. The number of these diagnostic cirri, as distinguished from the nondiagnostic subperipheral or polar cirri, is never very great; in large species like *H. prolixa* there are scarcely more than from half a dozen to a dozen, though in smaller species like *H. sarsii* the number of cirri available for systematic use is considerably greater.

Aside from the very great length and the large number of component ossicles in the diagnostic cirri of *H. prolixa*, these are somewhat abruptly larger than the other cirri and do not grade into them imper-

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ceptibly as is the case in the other species of the genus; this I find to be quite a characteristic feature.

In this species also the distal intersyzygial interval is usually four oblique muscular articulations instead of three as in the other forms. The greater size of the species accounts for this, however, as among the comatulids the distal intersyzygial interval is determined by the size of the animal and the number of arms, having only a remote and purely secondary relationship with generic or specific characters.

In fully grown specimens of this species the cirrus sockets near the periphery of the centrodorsal are arranged in four regular columns; of these the two outer consist of five or six sockets, but the two central have two (in smaller specimens one) sockets only, being distally replaced by a single column of three sockets, so that whereas in the proximal part of the centrodorsal there are four columns of cirrus sockets in each radial area in the distal there are but three. Young specimens of course have three columns of cirrus sockets in each radial area until the peripheral diameter of the centrodorsal is equal to the diameter through the lower sockets of the central columns in the centrodorsal of the adults.

Young specimens of this species, like young specimens of *Heliometra glacialis*, have the borders of the ossicles of the IBr series and lower brachials prominently spinous.

Carpenter and other authors have recorded *Hathrometra tenella* as occurring in the Arctic regions; but I have never been able to examine specimens of any species but *prolixa* from the Arctic, and I have a strong suspicion that the so-called *tenella* is merely the young of *prolixa*, or is based upon specimens which have lost their long and characteristic cirri. *H. tenella* is confined entirely to the western side of the Atlantic, and does not extend very far to the northward, not intruding at all upon the territory occupied by *prolixa*.

Though useless for ordinary systematic work the small subperipheral and polar cirri have a very great value in tracing out the line of descent of the species in which they occur; for each of these small cirri represents a fully grown cirrus at the stage in which the border of the centrodorsal was just beyond the proximal edge of its socket. The centrodorsal increases by addition to its proximal edge; when enough material has been added cirri are protruded between the proximal row of cirri and the border of the centrodorsal. These cirri grow to a certain length and attain certain definite characters. The cirri of the next row above grow to a greater length and possess a greater number of segments. This process keeps on until maturity is reached, after which the cirri of subsequent rows show no progressive change. The small polar and subperipheral cirri, the "small mature" cirri of Carpenter, are really persistent relics of successive young stages, and have no connection with the adult stage at all.

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HATHROMETRA DENTATA (Say).

1. East of New York; *Albatross;* Cat. No. 3244.—Five specimens.

HATHROMETRA SARSII (Düben and Koren).

1. Bodøfjord; Cat. No. 3618.—One small specimen.
2. No locality; Prof. J. Müller; Cat. Nos. 5337, 1052, and 1053.—Six specimens.

Family PENTAMETROCRINIDÆ.

PENTAMETROCRINUS TUBERCULATUS (A. H. Clark).

1. Japan; Dr. F. Hilgendorf; Cat. No. 2831.—Two specimens, badly broken.

One of these resembles the type of the species; the other is smaller and less tubercular. The cirri are all detached; the longest, which presumably came from the larger specimen, are from 18 to 22 mm. in length and are composed of from 16–17 segments.

This species is easily recognized by its short cirri which have comparatively few segments, and by the strongly curved terminal claw.

Carpenter, in the *Challenger* report, tentatively referred these specimens to *P. japonicus*, evidently overlooking the very characteristic detached cirri.

Family PENTACRINITIDÆ.

ENDOXOCRINUS WYVILLETHOMSONI (Wyville Thomson).

1. Off Portugal, 2133 meters; *Porcupine;* Cat. No. 1932.—One specimen.

ISOCRINUS ASTERIA (Linnæus).

1. St. Thomas, 250–600 meters; Cat. No. 3028.—One specimen.
2. No locality; Cat. Nos. 5346 and 5345.—Fragments.

ISOCRINUS DECORUS (Wyville Thomson).

1. Barbados; 234 meters; Wyville Thomson; Cat. No. 2024.—One specimen.

METACRINUS MOSELEYI P. H. Carpenter.

1. Mindanao, Philippine Islands; *Challenger;* Cat No. 2271.—A stem fragment of five internodes.

METACRINUS ROTUNDUS P. H. Carpenter.

1. Sagami Bay, Japan.—One specimen.

Family BOURGUETICRINIDÆ.

RHIZOCRINUS ROBUSTUS A. H. Clark.

1. Gulf of Mexico; *Albatross;* Cat. No. 3246.—One specimen.

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NOT IDENTIFIABLE.

1. Mauritius; Professor Möbius; Cat. No. 5349.—One specimen.

2. Southern Indian Ocean; *Gazelle*.—One specimen of some species of *Cyllometra*. (See Zool. Anzeiger, vol. 34, p. 368.)

3. Northwestern Australia; *Gazelle*.—One specimen, possibly of *Oligometra adeonæ*. (See Zool. Anzeiger, vol. 34, p. 368.)

NOTE.

In the course of my studies on the recent crinoids I have examined the material contained in all of the chief museums of the world, and have published separate accounts of several of these collections in order that their study by subsequent investigators may be facilitated and my work the more readily reviewed.

This is the sixth paper to be published of the series dealing primarily with the collection of a single museum, the preceding five being:

(1) On a Collection of Crinoids from the Zoological Museum of Copenhagen. Vidensk. Medd. fra den Naturhist. Forening i København, 1909, pp. 115–194.

(2) The Recent Crinoids of the Leyden Museum. Notes from the Leyden Museum, vol. 33, pp. 175–192 (1911).

(3) Notes sur les crinoïdes actuels du muséum d'histoire naturelle de Paris. Bulletin du muséum d'histoire naturelle, 1911, No. 4, pp. 243–260.

(4) The Recent Crinoids of Australia. Australian Museum Memoirs, No. 4, 1911.

(5) The Crinoids of the Indian Ocean. *Investigator* Monographs, 1912.

I hope soon to publish an account of the crinoids of the Hamburg Museum, and my notes upon the crinoids of the British Museum.

LIST OF THE PAPERS CONTAINING REFERENCES TO THE CRINOIDS IN THE COLLECTION OF THE MUSEUM FUER NATURKUNDE.

1840. Müller, Johannes. Monatsb. k. preuss. Akad. Wiss. Berlin, 1840, p. 6; also in Wiegmann's Archiv für Naturgeschicte, 1840, vol. 1, p. 311; also in l'Institut, 17 sept., 1840, p. 394.

1841. ——— Ueber die Gattungen und Arten der Comatulen. Monatsb. k. preuss. Akad. Wiss., Berlin, 1841, pp. 179–189; also in Wiegmann's Archiv für Naturgeschicte, 1841, vol. 1, pp. 139–148.

1843. ——— Neue Beiträge zur Kenntniss der Arten der Comatulen. Wiegmann's Archiv für Naturgeschicte, 1843, vol. 1, pp. 131–136.

1843. ——— Ueber den Bau des Pentacrinus caput-Medusae. Abh. k. preuss. Akad. Wiss., Berlin, 1840 (1843), pp. 177–248; abstract in Monatsb. k. preuss. Akad. Wiss., Berlin, 1840, pp. 88–106.

1849. ——— Ueber die Gattung Comatula, Lam., und ihre Arten. Abh. k. preuss. Akad. Wiss., Berlin, 1847, pp. 237–265.

1862. Dujardin, F., and H. Hupé. Histoire naturelle des Zoophytes. Echinodermes. Paris. (Crinoids, pp. 35–218; the information regarding the specimens in the Berlin Museum is taken from Müller, 1849.)

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1869. MARTENS, E. VON. In von der Decken, Reise in Ost-Africa in den Jahren 1859–1865. (Crinoids, vol. 3, p. 129.)

1877. GRAFF, L. VON. Das Genus Myzostoma.

1879. CARPENTER, PHILIP HERBERT. On the Genus Actinometra, Müll., with a Morphological Account of a new Species from the Philippine Islands. Trans. Linn. Soc. London (Zool.), ser. 2, vol. 2, pt. 1, pp. 1–122. (Preliminary abstract in Journ. Linn. Soc. London (Zool.), vol. 13, pp. 439–456 (1877).)

1887. GRAFF, L. VON. The Myzostoma. *Challenger* Reports, vol. 20, Zoology.

1888. CARPENTER, PHILIP HERBERT. Report on the Crinoidea collected during the voyage of H. M. S. *Challenger*. Part 2.—The Comatulæ. *Challenger* Reports, vol. 26, Zoology.

1889. STUDER, TH. Die Forschungsreise S. M. S. *Gazelle* in den Jahren 1874 bis 1876. Theil 3. Zoologie und Geologie.

1890. HARTLAUB, CLEMENS. Beitrag zur Kenntniss der Comatuliden-fauna des indischen Archipels. Nachr. Ges. Göttingen, Mai 1890, pp. 168–187.

1891. ——— Beitrag zur Kenntniss der Comatuliden-fauna des indischen Archipels. Nova Acta Leop.-Carol. deut. Akad. Naturf., vol. 58, No. 1, pp. 1–120.

1905. DÖDERLEIN, LUDWIG. Arktische Crinoiden. Fauna Arctica, vol. 4, pp. 395–406.

1909. CLARK, AUSTIN HOBART. Two New Australian Crinoids. Proc. Biol. Soc. Washington, vol. 22, pp. 39–42.

1909. ——— Systematic position of *Oligometra studeri*. Proc. Biol. Soc. Washington, vol. 22, p. 88.

1909. ——— The Crinoids of the *Gazelle* Expedition. Zoologischer Anzeiger, vol. 34, No. 11/12, pp. 363–370.

1910. ——— On the Type Specimen of the Crinoid described by Müller as *Alecto purpurea*. Proc. Biol. Soc. Washington, vol. 23, pp. 95–98, fig. p. 97.

1911. ——— The recent Crinoids of the Coasts of Africa. Proc. U. S. Nat. Mus., vol. 40, pp. 1–51.

1911. ——— Crinoidea (of southwestern Australia). Die Fauna Südwest-Australiens; Ergebnisse der Hamburger südwest-Australischen Forschungsreise 1905, vol. 3, Lief. 13, pp. 435–467.

1911. ——— The Recent Crinoids of Australia. Memoir IV, Australian Museum, Sydney, N. S. W. Scientific Results of the Trawling Expedition of H. M. C. S. *Thetis* off the Coast of New South Wales, in February and March, 1898 Part 15, pp. 705–804.

1912. ——— The Crinoids of the Indian Ocean. Echinoderma of the Indian Museum, Part VII, Crinoidea. Calcutta.

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THE INSECTS OF THE DIPTEROUS FAMILY PHORIDÆ IN THE UNITED STATES NATIONAL MUSEUM.

By J. R. MALLOCH,
Of the Bureau of Entomology, United States Department of Agriculture.

INTRODUCTION.

The species of this family are for the most part very small, black, or yellow flies that are easily overlooked, and the life history of which is very little known. It is considerably more than a century since the first species was described, and even now but little is known of its habits. If one accepts *florea* Fabricius (1794) as synonymous with *abdominalis* Fallen, which systematists are averse to doing, or *rufipes* Meigen, as examples of common species, it will be found that very little is known about their larval habits. It is rarely indeed that complete records of their life habits are found, and a list of those so recorded would not occupy a page of this paper. Those that have been reared have been for the most part upon fungi, or upon dead or decaying animal or vegetable matter. Some species have been reared from snails and a few from the bodies of bees, ants, or beetles, but whether the whole of those species were true parasites or not is a matter for conjecture. Several species are myrmecophilous, and in this section occur the most peculiar genera belonging to the family, the females being apterous, or semiapterous, and resembling the Pulicidæ more than the Phoridæ. The general body of the family have wings in both sexes, and their peculiar neuration separates them from any other Diptera, although they superficially resemble *Scatopse* in wing neuration. This is a genus belonging to the Bibionidæ, in which Fabricius described his species *florea* (1794), and the similarity in neuration very probably was responsible for his placing it here. In Phoridæ the costa extends to only the middle, or slightly beyond, or short of the middle of the wing, the thick costal vein being combed with long bristles in most species, and the only other thick veins are the first and third longitudinal veins, which join the costa at about its middle and its apex, respectively. The mediastinal vein is present in some genera and ends in the first longitudinal vein; the humeral vein is always present, and the second longitudinal vein

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is only represented by a small portion at near the apex of third, where it is separated from that vein, being coalescent with it for most of or its entire length; in the latter case the third vein is said to be unforked. There are four thin veins crossing the disk of the wing which are sometimes used for the separation of species or genera. The antennæ are 3-jointed, the first joint small, the second inclosed for the greater part in the very large third, which is more or less spherical or conical, and has a long 3-jointed dorsal or apical arista. The flies may be met with throughout the year, at least in houses, and I found a series here taken on Plummers Island, Maryland, on January 7, 1908.

HABITS OF THE PHORIDÆ

Appended is a list of some of the species whose habits are more or less known. The complete life history of most of these is still unknown.

Trupheoneura microcephala Loew, lives on dead caterpillars, but is not a true parasite (Hubbard and Riley).

Trupheoneura trinervis Becker, carrion and rotting fungi (Wood).

Trupheoneura perennis Meigen, carrion (Wood).

Trupheoneura fratercula Brues, in museum, with label "In nest of *Vespa germanica*." Plummers Island, Oct. 21, 1903. Labeled "*microcephala* Loew."

Trupheoneura opaca Meigen, on exhumed human bodies.

Paraspiniphora bergenstammi Mik, in putrid snails (Mik.). Specimens marked "From clean bones of turtle." Plummers Island, April 9, 1911 (Barber). In collection.

Paraspiniphora maculata Meigen, larva lives on dead snails (Wood, Ent. Mo. Mag., 1906, p. 262).

Pseudostenophora pubericornis Malloch, on *Agaricus* sp. (Malloch).

Pseudostenophora, new name, is a change of name for the genus *Stenophora* Malloch (Jour. Nat. Hist. Soc. Glasgow, vol. 1, 1909, p. 27), which is preoccupied.

Dohrniphora concinna Meigen (=*cimbicis* Aldrich), from cocoons of *Cimbex americana* (Aldrich).

Dohrniphora abdominalis Fallén, on carrion (Malloch).

Dohrniphora venusta Coquillett. (See under this species in list.)

Chætoneurophora thoracica Meigen, from mole's nest (Malloch).

Chætoneurophora caliginosa Meigen (=*urbana* Meigen). Same nest, and under carrion (Malloch).

Chætoneurophora curvinervis Becker, under carrion (Malloch).

Hypocera incrassata Meigen, parasite of honey bee in England and cause of foul brood (Packard, 1868).

Hypocera vitripennis Meigen, bred by Collin from nest of *Bombus* (Wood). From moss (Malloch).

Pseudohypocera clypeata Malloch, series in collection marked "On honey and wax." (See description of species.)

Apocephalus, species on ants. Lives parasitic in the heads of the adults of *Camponotus*, sp. Their presence causes the head of the ant to drop off. Habits discussed by Pergande (1901). (See descriptions of species.)

Aphiochæta epeiræ Brues, reared from egg cocoons of spider *Epeira* (Brues).

Aphiochæta fasciata Fallén, from Coccinellidæ that were feeding on Aphides (Rondani).

Aphiochæta nedæ Malloch, reared from *Neda marginalis*. (See under description of species.)

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Aphiochæta flava Fallén, larvæ on *Agaricus* (Schiner).
Aphiochæta fungicola Coquillett, from the fungus *Trametes pecki* (Coquillett).
Aphiochæta lutea Meigen, larvæ on *Agaricus* (Schiner).
Aphiochæta agarici Lintner, on decaying mushrooms (Lintner).
Aphiochæta pusilla Meigen (=*nigra* Meigen), in *Agaricus prunulus* (Schiner).
Aphiochæta pulicaria Fallén, in nest of *Vespa germanica* (Van der Wulp); from *Agaricus* (Schiner).
Aphiochæta minor Zetterstedt (=*minuta*, Aldrich), bred from cocoons of *Cimbex americana* (Aldrich). In mushrooms (Howard). This last record is incorrect as the identification is wrong.
Aphiochæta rufipes Meigen, quite a general feeder, Brunetti (Ent. Mo. Mag., 1889). In nest of *Vespa germanica* Newstead (Ent. Mo. Mag., 1861). From larva of *Nematus salicis* (Fitch). On turnip leaves, and in bee hives (Malloch). Specimens here in collection marked "On dead bees."
Aphiochæta scalaris Loew. (See under description of species.)
Aphiochæta conica Malloch, from abdomen of *Camponotus pennsylvanicus* (Pergande). In collection.
Aphiochæta aletiæ Comstock. (See under description.)
Aphiochæta juli Brues, Parasitic on myriapods. (See description.)
Aphiochæta cata Melander and Brues, and *rostrata* Melander and Brues. Collected about the burrows of the bee *Halictus pruinosus* (Melander and Brues).
Aphiochæta (?) *atlantica* Brues, on rotting *Aletiæ* pupa. (In collection.)
Aphiochæta evarthræ Malloch, from beetle *Evarthus ovatus* (in collection). From dead *Polyphilla* (in collection). Reared from fungi (Johnson).
Aphiochæta setacea Aldrich, from cocoon of *Cimbex americana* (Aldrich).
Aphiochæta humeralis Zetterstedt, found on poplar where a species of Coccinellidæ was abundant (Malloch).
Conicera atra Meigen, on exhumed human bodies. On corpse two years after burial (Webster, 1890).
Phora aterrima Fabricius, on buried human bodies (Megnin, 1895).
Metopina pachycondylæ Brues, as commensals with the ant *Pachycondyla harpax* Fabricius (Wheeler).
Syneura cocciphila Coquillett, from larva infesting heads of adults of *Icerya purchasi* (Coquillett); one specimen evidently of the same species on *I. braziliensis*.
Puliciphora venata [1] Aldrich, on dead shells (H. H. Smith).
Puliciphora lucifera Dahl, on flowers of giant *Arum* that smell like carrion.
Platyphora lubbocki Verrall, Myrmecophilous (Verrall).
Plastophora formicarum Verrall, Myrmecophilous (Verrall).
Plastophora antiguensis Malloch, attacking *Solenopsis geminata*.
Plastophora crawfordi Coquillett, attacking *Solenopsis geminata* (Crawford).
Plastophora curriei Malloch, attacking *Solenopsis geminata* (Currie).
Psyllomyia testacea Loew, Myrmecophilous with *Dorylus* (Brues).
Commoptera solenopsidis Brues, Myrmecophilous with *Solenopsis geminata* (Brues).
Ecitomyia wheeleri Brues, Myrmecophilous with *Eciton* (Brues).
Ænigmatias blattoides Meinert, Myrmecophilous (Meinert).
Aconistoptera melanderi Brues, Myrmecophilous with *Eciton opacithorax* (Brues).
Xanionotum hystrix Brues, Myrmecophilous with *Eciton* spp. (Brues).
Wandolleckia cookii Brues, on land molluscs (*Achatina*) (Cook).
Schulz records [2] Phoridæ attacking butterflies of the genera *Morpho* and *Helicopsis* in Brazil.

[1] See under specific descriptions.
[2] Zool. Anz., vol. 28, 1904, pp. 42–43.

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TERMINOLOGY USED IN PAPER.

Anal protuberance. An organ in the male which projects beyond the genitalia, and is generally furnished at its lateral extremities with two long, curved, pubescent bristles.

Antenna. This consists of three joints. The third joint is practically all that is visible to anything except the higher magnification lenses, and is the only one which is referred to in descriptions.

Costa. That part of wing bordered by the thick costal vein, extending to from one-third to two-thirds of the wing length in different species, and more or less combed with thick-set bristles or hairs.

Costal divisions. The first division is taken as extending from the humeral cross vein to the junction of the first vein with the costa. The second is taken as from the farther side of the first vein to the near side of the fork, or the tip of third vein as the case may be. When the term "remainder" is used as against the length of first division both second and third are included as one. The third is that inclosed by fork of third vein and tip of same.

Fork of third vein. This is really the second vein, which is coalescent with the third to near its junction with the costa.

Frons. That portion of head bordered by the compound eyes laterally, the face in front (which is hidden by the very large antennæ and is more or less invisible except from directly in front), and the occiput behind.

Frontal bristles. These are transversely four-rowed in *Phora* and *Aphiochæta* as well as some of the other genera. The FIRST row consists of two or four bristles situated on the center of frons directly over the antennæ and are in some genera RECLINATE, i. e., lying back over the frons as the other bristles do, or PROCLINATE, i. e., projecting over the antennæ and downward, or ERECT, i. e., projecting straight out over the antennæ. Those bristles are in my opinion but one row, and in some cases we find them more or less in line. The SECOND row consists of four bristles which are, when the frons is elongated, sometimes much out of line, and the central pair drops farther down and nearer the eye margin the longer the frons is. The THIRD row is situated more or less closely to the anterior ocellus and consists of four bristles. The FOURTH row consists of four bristles situated, two on the ocellar triangle and one on near each eye margin. There are in most species two other bristles situated on the back of the vertex and directed inward toward the ocelli, but little account is taken of them in descriptions of species. In descriptions in *Aphiochæta* the first row is called the POST-ANTENNAL and the second row is called the FIRST row—i. e., of reclinate bristles.

Frontal suture. A suture or depression more or less distinct in *Aphiochæta* that runs from front ocellus to front edge of frons.

Hind tibial armature in Aphiochæta. The hind tibia has a raised ridge running from base to tip on the dorsal surface, which is generally clothed with very short hairs. Those hairs in the species with yellow legs give the insects the appearance of having a black dorsal line, and some writers refer to these as having the "tibiæ black-lined above." The great majority of the species have a single row of serial bristles on the postero-dorsal surface just below the dorsal ridge, but in some this is duplicated more or less fully on the antero-dorsal surface.

Leg surfaces. These are arrived at by taking the legs as at right angles to the body, and considering the upper surface as the dorsal and the under as the ventral.

Mesopleural bristles. These are situated on the mesopleura, on the upper posterior angle close in front of wing base, and are in the black species very difficult to detect.

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CLASSIFICATION.

It is almost impossible to adopt an unfailing system for descriptions, so that one unacquainted with the family may work out the species, and different writers have adopted different characters for arranging them, so that it is sometimes almost impossible to tell what species is intended from the description; but in the following tables I have used those characters only which are generally recognized as reliable, and endeavored to keep clear as much as possible of the use of those characters that are variable in compiling my tables. Color is not an unfailing guide, nor is the number of scutellar bristles so constant that it may be used with entire confidence; but when necessary I have introduced species into the tables under both "black or brown," and "yellow" or with "two" or "four scutellar bristles." So many species are new to science in the collection that it is deemed necessary to give tables and descriptions of all the species, described and undescribed.

I have added at end of this paper descriptions of some of the exotic Phoridæ in the collection, but have not included them in the tables, as that might unnecessarily involve matters when anyone endeavored to identify native Phoridæ by the use of these tables. It is not probable that any of those species occur in America.

Several important changes in nomenclature are proposed in this paper, for all of which I consider there is a necessity, owing to our increased knowledge of the group and the desirability of having matters of this kind on as reliable a basis as possible.

TABLE OF GENERA.

1. At least mid tibiæ with preapical spines other than the terminal spurs.....2.
   Mid tibiæ without spines other than the apical spurs.....8.
2. Third vein forked, generally two spines at basal third of mid tibia.....3.
   Third vein unforked.....6.
3. Seventh vein (fourth thin vein) absent, or indistinct and abbreviated. *Trupheoneura*, p. 417.
   Seventh vein distinct and complete.....4.
4. Third longitudinal vein bristly on its whole length, the bristles very short and lying close to vein surface.....*Chætoneurophora*, p. 422.
   Third longitudinal vein without such close lying bristles, generally entirely bare.5.
5. Mid tibia with two strong spines on basal third and one at about apical third, hind tibiæ with a variable number of spines, costa to middle, fourth vein distinctly curved at origin.....*Paraspiniphora*, p. 425.
   Mid tibia with two spines at basal third and one small one at near apex, hind tibia generally with short hair-like bristles on antero-dorsal surface in addition to any bristles that may be present, costa short, fourth vein nearly straight, proboscis enlarged in females of some species.....*Dohrniphora*, p. 430.
6. Velvet black species, middle tibiæ with several long dorsal spines, frontal bristles arranged in two upper rows of four each and two lower rows of two each, frons in male very narrow.....*Phora*, p. 437.

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Not velvet black species, mid tibiæ with only two spines at basal third and one at apical third or at near apex.....7.

7. Small species, three rows of frontal bristles, the two upper of four each and the lower of two, male third antennal joint conical, arista apical....*Conicera*, p. 436.

Larger species, three rows of four frontal bristles and generally also two post-antennal reclinate bristles, antennæ sometimes somewhat conical, but arista dorsal or subapical.....*Hypocera*, p. 433.

8. Wings present, and of usual size.....9.

Wings very much reduced, or absent.....23.

9. Third vein forked.....10.

Third vein unforked.....14.

10. Frons with at least two upper rows of four bristles.....11.

Frons with weak hairs, and four very weak bristles on the vertex, costa destitute of bristles.....*Gymnophora*, p. 500.

11. Frontal bristles erect, not projecting downward over the antennæ.....12.

Frontal bristles proclinate, *i. e.* projecting downward over the antennæ; or reclinate, *i. e.* lying back over frons as the other frontal bristles do.....13.

12. Mediastinal vein absent, clypeus, much produced, especially in female. *Pseudohypocera*, p. 439.

Mediastinal vein present, clypeus not produced in either sex.....13. *Beckerina*, p. 441.

13. Frontal bristles proclinate, female ovipositor generally retracted and fleshy. *Aphiochæta*, p. 445.

Frontal bristles reclinate; female ovipositor chitinised, projecting. *Apocephalus*, p. 442.

14. Frons wholly destitute of bristles.....*Platyphora* [1] Verrall.

15. Frons with rows of bristles.....16.

16. First longitudinal vein absent.....*Ecitomyia*, p. 508.

First longitudinal vein present.....17.

17. Post-antennal bristles reclinate, hind tibiæ fringed above with bristles; female ovipositor exserted, chitinous.....*Melaloncha*, p. 500.

Post-antennal bristles not reclinate.....18.

18. Post-antennal bristles absent, wings very hairy..... *Chonocephalus*, p. 510.

Post-antennal bristles present, proclinate.....19.

19. Spurs of posterior tibiæ well developed.....20.

Spurs of middle tibiæ wanting, those on hind tibiæ minute.....22.

20. Ovipositor of female prolonged, stout, and heavily chitinised, wing neuration normal.....*Plastophora*, p. 500.

Ovipositor of female retracted, fleshy.....21.

21. First and third veins much approximated, legs very stout.....*Synevra*, p. 503.

First and third veins widely separated, legs not stout, much as in *Aphiochæta*. *Parasyneura* [2], p. 516.

22. Frons with two, or three transverse rows of bristles; female apterous. *Pulicisphora*, p. 504.

Frons with four transverse rows of bristles; female with wings..*Metopina*, p. 503.

23. Wings present, but reduced in size.....24.

Wings entirely absent.....27.

24. Wings very narrow with very long bristles.....25.

Wings without long bristles.....26.

[1] *Platyphora* Verrall has not been reported from America, but it has been suggested that it may probably prove to be the male of *Ænigmatias* Meinert, so I have included it in the table.

[2] *Parasyneura*, new genus, is a Javanese genus, but I have included it in the table, as it is new to science and I desire to indicate its affinities more clearly.

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25. Abdomen with several transverse rows of very long and strong bristles. *Xanionotum*, p. 510.
Abdomen bare.....*Acontistoptera*, p. 509.
26. Wings narrow, strap-like.....*Ecitomyia*, p. 508.
Wings more or less triangular and indistinctly veined.....*Commoptera*, p. 509.
27. Body, seen from above, oval, cockroach-like.....*Ænigmatias*, p. 511.
Body, seen from above, of the usual shape, more or less constricted into three parts.....28.
28. Ocelli and ocellar bristles present.....*Puliciphora*, p. 504.
Ocelli and ocellar bristles absent.....*Chonocephalus*, p. 510.

DESCRIPTIONS OF SPECIES.

Genus TRUPHEONEURA[1] Malloch.

TABLE OF SPECIES.

1. Halteres black, or brown.....2.
Halteres yellow.....7.
2. Fork of third vein very long, starting at below tip of first vein.*occidentalis*, p. 417.
Fork of third vein not long, starting much beyond end of first vein.....3.
3. Scutellum with four equal bristles.....4.
Scutellum with two bristles and two small weak hairs.....5.
4. Third vein very thick, thicker on its entire length than costa at tip, legs all piceous. *pachyneura*, p. 418.
Third vein not thicker than costa at tip, legs nearly all yellow.....*varipes*, p. 419.
5. Wings limpid, first vein ending much nearer to tip of costa than to humeral vein. *vitrinervis*, p. 419.
Wings grayish, first vein ending at midway between humeral vein and tip of costa.....6.
6. Male palpi of normal size and moderately bristly.....*fratercula*, p. 420.
Male palpi large and very weakly bristled.....*suspecta*, p. 420.
7. Male palpi very large and nearly bare.....*microcephala*, p. 421.
Male palpi normal in size and moderately bristle.....*subfusca*, p. 422.

TRUPHEONEURA OCCIDENTALIS Brues.

Female.—Black; frons slightly broader than long, polished and unpunctured, post-antennal bristles widely separated, first row scarcely higher than post-antennals, equidistant and nearly straight, antennæ small, rounded, arista strongly pubescent; palpi slender, bristly toward the tips, proboscis short, membranous, four scutellar bristles, the anterior pair weak; second abdominal segment not elongate, surface of abdomen sparsely hairy; legs black, trochanters and knees yellow, anterior tibiæ without bristles, mid tibiæ with the usual two bristles, hind tibiæ with one bristle just before middle; wings infuscated, especially on anterior half and along course of veins, costa to beyond middle, fringe short, sparse and delicate, costal vein thickened on apical half, first division one-fourth longer than other two together, third as long as second, the fork of third vein originating very far basally, nearer to base of fifth than fourth vein and opposite to tip of

[1] Jour. Nat. Hist. Soc. Glasgow, vol. 1, 1909, p. 27.

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first vein on costa, third vein bristly to fork, which is at about its middle, fourth vein rather sharply curved at its base, straight elsewhere, ending well before wing tip, seventh very distinct at base but not reaching margin of wing; halteres black.

Length, 2–3 mm.

Described by Brues [1] from two specimens from Pullman, Washington, and Moscow, Idaho. Unrepresented in collection.

TRUPHEONEURA PACHYNEURA Loew.

Male and female.—Black, distintly shining; frons in male very short, about one-third as long as broad, in female nearly one-half as long as broad, frontal bristles longer in male than in female, third antennal joint in male very large, round, and strongly pubescent, in female normal in size and not so distinctly pubescent, arista longer than breadth of frons and pubescent in both sexes, palpi black, in male broad and leaf-like with very weak bristles, in female narrow, and normally bristled, female proboscis very large, exserted, longer than palpi; thorax shining black, scutellum with four subequal bristles, abdomen opaque black, second and sixth segments elongated in both sexes, posterior margin of sixth segment with long and posterior margins and sides of other segments with distinct, though not particularly long hairs, male hypopygium very large, exserted, glossy black at base and extreme tips of lamellæ, forceps-like lamellæ nearly symmetrical, anal protuberance small, brown, some long hairs on extremity of hypopygium; legs piceous, very strong, the fore tarsi in both sexes distinctly thickened, hardly longer than tibiæ, fore tibial bristle weak or absent, mid tibial bristles present on basal third, hind tibiæ without any bristle on basal half; wings grayish, costa to beyond middle in both sexes, increasing much in thickness from end of first vein to tip, first division as long as other two in both sexes, third two-thirds as long as second, fringe very short and fine, third vein very thick and black, as thick on its whole length as costa at thickest part, fourth vein leaving third at one-third beyond fork with a distinct bend, more pronounced in female, and ending slightly recurved at as much in front of wing tip as fifth does behind it, seventh vein reaching two-thirds of the length to wing margin; halteres black.

Length, 2½–4 mm.

I have examined specimens in C. W. Johnson's collection from Moscow, Idaho; Olympia and Seattle, Washington; and Montreal, Quebec. A very distinct species, and easily known by the very thick third vein. I have redescribed this species, as so many important characters were not given in Loew's original description and Brues's paper on the group.

[1] Journ. N. Y. Ent. Soc., vol. 16, 1908, p. 200.

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TRUPHEONEURA VARIPES, new species.

Male.—Black, shining; frons shining, less than half as long as broad, frontal bristles of moderate length, antennæ above normal size, black-brown, pubescent, arista longer than breadth of frons, pubescent, palpi large, leaf-like, weakly bristled, black-brown; thorax shining, scutellum with four equal bristles; abdomen dull black, first, second, and sixth segments subequal, elongated, third, fourth, and fifth short, subequal, barely half as long as the others, hypopygium glossy black, very large, as long as sixth segment, terminal lamellæ papilla like, anal protuberance yellowish, hairy, and of moderate size; legs yellow, only the femora of anterior pair at base and the posterior pair on basal two-thirds brownish, fore tarsi slightly thickened, fore tibial bristle at just above middle, mid tibiæ with two setulæ at about basal third and one very weak one at near apex, hind tibial bristle large, and at just above middle; wings grayish, costa to distinctly beyond middle, very thick from beyond end of first vein, first division about one and one-third times as long as other two together, third nearly as long as second, fringe very short and close, third vein brown, not so thick as costa at tip, a distinct bristle at base, fourth vein leaving much as in *pachyneura* but ending distinctly nearer to tip of wing than fifth, seventh vein very indistinct and not reaching more than two-thirds to margin of wing; halteres black.

Length, 3 mm.

One male, Lawrence, Kansas (C. W. Johnson). Type in collection of C. W. Johnson.

TRUPHEONEURA VITRINERVIS, new species.

Plate 41, fig. 2.

Male.—Black, shining; frons shining, about one-third broader than high, bristles rather weak, antennæ of moderate size, brownish black, arista slightly pubescent, palpi bright yellow, rather small, weakly bristled; thorax distinctly shining, scutellum with four bristles, the anterior pair hardly more than coarse hairs; abdomen rather dull, second, and sixth segments elongated, sixth distinctly glossy, hypopygium large, very glossy, black above, but the complicated ventral processes yellowish; legs yellowish-brown, hind pair darker, fore tibiæ with a small antero-dorsal spine at basal third, the usual pair at basal third of mid tibiæ, and one at basal third of antero-dorsal surface on hind tibiæ; wings vitreous, veins very indistinct, except the costal from its junction with the first vein, the apical half of first, and the third vein, which are pale brown, costa to beyond middle, fringe very short and fine, first division distinctly longer than other two together, third section nearly equal to second, fork of third vein

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acute and rather long, third vein with very short bristles from base to fork, first vein very thick on apical half, fourth vein leaving third at nearly a right angle, then turning abruptly and running nearly straight to wing tip, sixth vein very distinctly bent toward anal angle of wing at near base, seventh vein indistinct and not reaching margin of wing; halteres black-brown.

Length, 2½ mm.

One specimen, White Mountains, New Hampshire (Morrison), from collection of C. V. Riley.

Type.—Cat. No. 14823, U.S.N.M.

Near to *vitrea* Wood and *sublugubris* Wood, especially the latter, but quite easily separable. Labelled *Phora aptina*, Schiner (Coquillett).

TRUPHEONEURA FRATERCULA Brues.

Male.—Black; frons short, one and three-fourth times as broad as long, with the usual bristles, antennæ black, of rather large size and strongly pubescent, arista pubescent and much thickened at base, palpi small, black, bristling normal; thorax subshining, two scutellar bristles; abdomen dull black, grayish pollinose, hypopygium of rounded form, black and slightly pollinose; legs long and rather slender, a little lighter on the anterior coxæ and knees, mid and fore tibial bristles as usual, hind tibial bristle at the basal third; wings slightly infuscated, costa to wing middle, first division equal to the other two together, fringe very short and close, fourth vein leaving at fork of third, and ending just before tip, not recurved at tip, seventh vein absent, halteres brown or black.

Length, 2 mm.

Described from two males from Jackson's Lake, Wyoming.[1] The type specimen in the collection is in very poor condition as it has lost both wings. There are two specimens from Plummers Island, Maryland, "from wasp's nest," that may be females of this species, but they are in rather poor condition. They are certainly not *microcephala* Loew, as labeled.

TRUPHEONEURA SUSPECTA, new species.

Male.—Black, shining; frons shining, nearly twice as broad as long, first row of bristles nearly straight, second convex, antennæ velvety black, third joint distinctly pubescent, large and rather pointed, arista bare, palpi black, large and projecting, weakly bristled, proboscis brown, smaller than palpi; thorax shining, scutellum with two strong bristles; abdomen broad, dull black in color, first and second segments subequal, last three segments with a few scattered hairs, hypopygium very large, glossy black at base, elsewhere gray pollinose, terminal forceps-like lamellæ asymmetrical; legs piceous, fore tibiæ,

[1] Trans. Amer. Ent. Soc., vol. 29, 1903, p. 341.

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tips of fore coxæ, and trochanters paler; fore and mid tibiæ with the usual setulæ, hind tibiæ with a distinct, rather long bristle at basal third; wings grayish, costa to slightly beyond middle, first division equal to other two together, third barely half as long as second, fringe not longer than diameter of costal vein, fourth vein very distinctly bent at base, originating at beyond fork of third and ending nearly straight at wing tip; seventh vein indistinct and not reaching the wing margin; halteres black.

Length, 2½ mm.

Locality.—North Dakota, July 8, 1904 (E. S. G. Titus).

Type.—Cat. No. 14824 U.S.N.M.

I felt inclined to consider this as *pachyneura* Loew, before I saw examples of that species, but it is quite distinct from it. Especially I may mention the presence of only two scutellar bristles and the fact that the third thick vein does not show any remarkable thickening, though it is thicker than the costa.

TRUPHEONEURA MICROCEPHALA Loew.

Male and female.—Shining black; frons shining, slightly pollinose, nearly twice as broad as long, first row of bristles convex, antennæ black-brown, not above normal size in either sex, arista very long, three times as long as frons, distinctly pubescent, palpi in male very large and broad, nearly as long as height of head, and almost without bristles, in female above the normal size but moderately bristled, black in both sexes, proboscis in neither sex protruding; thorax shining, humeri brownish, scutellum with only two bristles in both sexes; abdomen in male rather long and narrow, second segment much longer than first; last three segments and sides of basal segments with scattered, rather long hairs, hypopygium large, protruding, gray pollinose, terminal forceps-like lamellæ asymmetrical, numerous conspicuous hairs on terminal lamellæ and on ventral process, female abdomen with segments subequal and all segments with scattered, rather long hairs; legs piceous, tibiæ paler, the usual bristles on all tibiæ; wings grayish to fuscous, costa to very distinctly beyond middle, thickened on apical half beyond apex of first vein, first division barely as long as other two together, second and third subequal in length, fourth vein leaving at midway from fork of third vein to tip with a very distinct bend, and ending nearly straight at close to wing tip, seventh vein very indistinct, rudimentary; halteres yellow.

Length, 2–4 mm.

There are some differences between the above description and that of Loew as copied by Brues, but I believe they are more the result of inaccuracy of observation by Loew than that the specimens before me are not the same as his which were from the District of Columbia

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also. There is a good series before me from very near the District of Columbia (Plummers Island, Maryland, Jan. 7, 1907, W. L. McAtee) and one female from Ithaca, New York (Johannsen). There are also two females from the former locality taken by A. K. Fisher, January 1, 1907, and March 29, 1908.

TRUPHEONEURA SUBFUSCA, new species.

Male.—Very similar to the above species, but not so distinctly shining, the frons is entirely dull, distinctly produced anteriorly in center, the outer bristle in first row is very far—one-fifth of breadth of frons—from eye-margin, and very near to anterior margin of frons, both first and second rows very slightly convex, antennæ velvety black brown, large, rounded, arista at least three times as long as frons, distinctly pubescent, palpi large, but not blunt at tip as in *microcephala*, and with normal bristling, thorax dull black, pleuræ brownish, scutellum with two bristles, abdomen long and narrow, cylindrical, the second segment elongated, third, fourth, and fifth, subequal, sixth elongated, second segment with numerous lateral hairs the others with scattered hairs especially on sides, sixth with numerous rather strong hairs especially on posterior lateral angles, hypopygium large and strongly haired, the lamellæ asymmetrical, the left side being the longest and broadest, anal protuberance small and inconspicuous, legs paler than in *microcephala*, the bristles weak, that on the fore tibiæ near the middle, the pair on mid tibiæ at basal third unequal in size, the one on the postero-dorsal surface very small, hind tibial bristle at near middle, weak; wings grayish, costa to distinctly beyond middle, the costa beyond first vein is much less swollen than in the above species and the third costal division is distinctly shorter than the second; halteres yellow.

Length, 3 mm.

One male, labeled *Phora microcephala* Loew?; from Cambridge, Massachusetts, April 4, 1870.

Type.—Cat. No. 14825, U.S.N.M.

Genus CHÆTONEUROPHORA, new name.

I erected this genus under the name *Chætoneura*[1] in 1909, but afterwards discovered that it was preoccupied and now propose to alter it as above.

TABLE OF SPECIES.

1. Halteres black ..... 2.
   Halteres pale ..... 3.
2. Abdomen (at least in female) with from middle of third segment to apex red. *variabilis*, p. 423.
   Abdomen in both sexes black ..... *curvinervis*, p. 423.

[1] Jour. Nat. Hist. Soc. Glasgow, vol. 1, 1909, p. 26.

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3. Costa distinctly thickened; hind tibia with two spines at basal third, one at apical third, and one just before apex ..... *thoracica*, p. 423.
Costa not particularly thickened ..... 4.
4. Thorax reddish or yellowish; hind tibia with one spine at basal third, one at near middle, and one at near apex ..... *olympiæ*, p. 424.
Thorax black ..... 5.
5. Hind tibia with only two spines ..... *fennica*, p. 424.
Hind tibia with at least four spines ..... 6.
6. Hind tibia with two spines at apical third, and two at apex ..... *luggeri*, p. 424.
Hind tibia with at least five spines ..... 7.
7. Hind tibia with five to six spines, fore tibia with one spine ..... *caliginosa*, p. 424.
Hind tibia with seven spines, fore tibia with two spines ..... *spinipes*, p. 424.

In the collection there are specimens of *thoracica* Meigen, *luggeri* Aldrich, *olympiæ* Brues (type) and *spinipes* Aldrich. The other species are unrepresented and with the exception of *curvinervis* Becker, which Brues says occurs in Washington, and *variabilis* Brues, they are not reported from America.

CHÆTONEUROPHORA VARIABILIS Brues.

This species is only recorded for the State of Washington and is very similar to *curvinervis* Becker, from which it differs principally in having a pair of spines at the basal third and one spine at the apex of hind tibia, the abdomen is red from the middle of the third abdominal segment to the apex, the antennæ are brown, or fulvous, the second abdominal segment is lengthened and in the type the apical half of abdomen is strongly hairy.

It is quite probable that the male of this species has the abdomen black and if so, it will be separable from *curvinervis* by the arrangement of the bristles on the hind tibia and the paler legs.

CHÆTONEUROPHORA CURVINERVIS Becker.

This species is quite the commonest of this genus in Europe, occurring on carrion in spring and early summer. It received its specific name from the very acutely bent fourth vein. It is, at least in Europe, an almost entirely black insect, the legs being but little paler. The arrangement of hind tibial bristles is as follows: One at basal third, and one at near apex of antero-dorsal surface and one on middle of dorsal surface. I have seen a specimen from New Hampshire (Johnson) that agrees in most particulars with this species, but the spines on hind tibiæ are not situated as in normal *curvinervis*.

CHÆTONEUROPHORA THORACICA Meigen.

Plate 35, fig. 8.

This is a large species with the thorax generally reddish, the postalar calli are always so, the costa especially in the female is distinctly thickened, the wings of female are generally distinctly clouded at apex, the hind tibia bears one spine at the apical third, one at the

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middle, and one at near the apex of the antero-dorsal surface, and one at near the basal third of the postero-dorsal surface. Sometimes there is an adventitious spine occurs in the species of this genus and alters the position of the usual spines but it generally occurs on one side only, and if other characters are taken into consideration no trouble need be anticipated in correctly placing the species.

Franconia, New Hampshire, Mrs. Slosson, one female.

CHÆTONEUROPHORA OLYMPIÆ Brues.

This species seems to be very distinct from all others in the genus by its very pale color; the thorax is reddish yellow; the abdomen is black at the base, and the apical half is orange; the legs are all yellow, and the hind tibia has one spine at apical third of dorsal surface, one at near the middle of antero-dorsal surface, and another on same surface at near apex. The species is quite as large as *thoracica* Meigen, being 5 mm.

Olympia, Washington. I have also seen it from Ithaca, New York. (O. A. Johannsen.)

CHÆTONEUROPHORA FENNICA Becker.

This is a comparatively rare European species that is not yet recorded from America. It is rather smaller and more robust than the other species in the genus and may be known by the presence of only two hind tibial bristles, one dorsal, at the basal third and a second, subapical one on the antero-dorsal surface.

CHÆTONEUROPHORA LUGGERI Aldrich.

This species resembles *fennica* Becker, but is separable by the number of bristles on the hind tibia. Those are situated, one on the dorsal and one on the antero-dorsal surface and one on nearly the dorsal and one on the antero-dorsal surfaces, transversely, at near apex.

Localities.—Plummers Island, Maryland; Franconia, New Hampshire (Mrs. Slosson); Lawrence and Baldwin, Kansas (Bridwell); St. Paul, Minnesota; New Bedford, Massachusetts (Hough), and one without locality, collection of Coquillett.

CHÆTONEUROPHORA CALIGINOSA Meigen.

This is not so far recorded from America. It may be distinguished from any of its congeners by the number and location of the hind tibial spines. Occurs along with *curvinervis* Becker, about carrion.

CHÆTONEUROPHORA SPINIPES Coquillett.

Resembles in most particulars the last species but whereas *caliginosa* has only three serial spines on the postero-dorsal surface, and two on antero-dorsal surface, one at near middle and one at near the

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apex, *spinipes* has four spines on almost the dorsal surface, the upper being at near the basal third, and three on the antero-dorsal surface, one below the basal third, one below the middle, and one at near the apex. There are also two serial spines on the fore tibia in *spinipes* instead of only one as in *caliginosa*.

Type.—Hartford, Connecticut. Four specimens from Moscow, Idaho, and one specimen from Columbus, Ohio.

Genus PARASPINIPHORA, new name.

The name, *Spiniphora*, I used [1] for this genus being preoccupied I propose the above alteration as substitute.

TABLE OF SPECIES.

1. Thorax red or yellow.....10.
   Thorax black.....2.
2. Halteres black, hind tibia with three spines, one at basal third and one at apical third on antero-dorsal surface, and one at middle on antero-ventral surface, as well as 7–8 small setulæ on postero-dorsal surface.....*strobli*, p. 425.
   Halteres yellow.....3.
3. Wings with a dark spot at base of fourth vein, mid tibia with two ventral spines.....*maculata*, p. 426.
   Wings unspotted.....4.
4. Scutellum with pale hind margin, a series of four spines on postero-dorsal surface, and one at basal third and one at near apex on antero-dorsal surface on hind tibia.....*scutellata*, p. 426.
   Scutellum unicolorous.....5.
5. Mid tibia with two or three strong spines in addition to the usual three, hind tibia with antero-ventral spines.....*spinosissima*, p. 426.
   Mid tibia with only the usual three spines.....6.
6. Hind tibia with an antero-ventral spine at middle.....7.
   Hind tibia without antero-ventral spine.....9.
7. Thorax black or reddish, never yellow, with two pairs of dorso-central bristles.....*bergenstammi*, p. 426.
   Thorax with only one pair of dorso-central bristles.....8.
8. Hind tibia with only three spines.....*trispinosa*, p. 427.
   Hind tibia with eight spines.....*spinulosa*, p. 429.
9. Hind tibia with two spines and three end spurs.....*bohemanni*, p. 427.
   Hind tibia with four spines and two end spurs.....*excisa*, p. 427.
10. Hind tibia with about 16 transverse rows of short bristles on dorsal surface. *multiseriata*, p. 428.
    Hind tibia without such short bristles.....11.
11. Hind tibia without ventral spine.....*erythronota*, p. 428.
    Hind tibia with ventral spine.....12.
12. Hind tibia of male with three spines, of female with seven or eight..*dorsalis*, p. 429.
    Hind tibia in both sexes with 5 spines.....*slossonæ*, p. 428.

PARASPINIPHORA STROBLI Becker.

A species as yet unrecorded from America; the characters given in table ought to distinguish it. It is the only species in the genus with dark halteres.

[1] Jour. Nat. Hist. Soc. Glasgow, 1909, vol. 1, 1909, p. 27.

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PARASPINIPHORA MACULATA Meigen.

Not so far as I know recorded for America. It is easily distinguished by the characters given in the table. Bred from snails.

PARASPINIPHORA SCUTELLATA Brues.

Plate 35, fig. 7.

The type is in the Museum collection from Grenada, West Indies. An easily distinguished species.

PARASPINIPHORA SPINOSISSIMA Strobl.

Plate 35, fig. 4.

I found a specimen of this species in the collection along with *C. spinipes* Coquillett. In addition to the character mentioned in the table this species has two spines on the postero-dorsal surface of fore tibia, one at the basal and one at the apical third, and 4–5 spines on each of the antero- and postero-dorsal surfaces of hind tibia and 4–5 very long apical spines on the latter. It is a deep black species, only the halteres, leg joints, and fore tarsi and tibiæ pale. The bristles are very strong; the wing has the costa to about the middle and the first section from the humeral vein to the tip of first vein more than one and one-half times as long as the remainder.

Locality.—Plummers Island, Maryland (W. L. McAtee), 23–4–08.

PARASPINIPHORA BERGENSTAMMI Mik.

Plate 35, fig. 6.

There is evidently considerable confusion regarding this species. Doctor Wood recorded a new species with two dorso-central thoracic bristles under the name of *domestica*. He had taken quite a number of females of typical *bergenstammi* with the usual two pairs of bristles, but could not get the male. On the other hand he had taken 17 males of his *domestica*, but failed to find the female of it. Under the impression that these bristles were an unfailing guide he described the male as a new species. Some time afterwards, in identifying the Phoridæ sent me from Cambridge University Museum (England), I found a male and female taken in copulation which represented both species, and on the strength of all the circumstances I sunk *domestica* Wood as a synonym of *bergenstammi* Mik. In examining the material in the United States National Museum collection I found a species standing as *comstocki*, Aldrich, that is in my opinion typical *bergenstammi*, and as I can not see any particular in which it varies from Mik's species have sunk this name as a synonym of that species. The position of the spines on the hind tibia in the type specimen of *comstocki* Aldrich agree with Becker's description, which is, "one

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spine on the postero-dorsal and one on the antero-ventral surface at the middle, and one at the basal and one at the apical third on the antero-dorsal surface as well as two long end spurs."

Besides the type of *comstocki* from Ithaca, New York, there are two specimens "from clean bones of turtle," Plummers Island Maryland (Barber).

PARASPINIPHORA TRISPINOSA, new species.

Plate 35, fig. 2.

This species closely resembles the above but it is smaller, darker, and distinctly shining; has only one pair of dorso-central thoracic bristles; has the front pair of scutellar bristles but little weaker than the posterior; the second and sixth abdominal segments prolonged, the former with several rather short lateral bristles and the latter with a fringe of long, apical bristles; the fore and mid tibiæ are bristled as in *bergenstammi*, but the hind tibia has only one spine at the basal third and one at near the apex on the antero-dorsal surface, one spine at the middle on the antero-ventral surface, and two apical spurs; the costa reaches short of the middle of the wing (in *bergenstammi* to fully the middle) and the fork of the third vein is more abrupt than in *bergenstammi*, causing the third section of the costa to be nearly equal to the second instead of only half the length as in Becker's figure and Aldrich's type of *comstocki;* the costal fringe is also longer than in *bergenstammi* being twice the length of the diameter of the costa.

There is only one male in the collection from Kaslo, British Columbia, June 22, 1903 (R. P. Currie).

Type.—Cat. No. 14826, U.S.N.M.

PARASPINIPHORA EXCISA Becker.

This species has not been taken in America so far as I am aware. Besides the characters used in the table, it may be known by having the first section of the costa hardly longer than the second, the costa, which is short fringed, reaches to beyond the middle of the wing.

PARASPINIPHORA BOHEMANNI Becker.

This species, which was described from the female only, I have never seen, but the position of the bristles on the hind tibia ought to distinguish it. The costa does not reach the middle of the wing, and the first section is about twice as long as the remaining part. Not recorded for America.

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PARASPINIPHORA MULTISERIATA Aldrich.

Plate 35, fig. 5.

This very distinct species is represented in the collection by three specimens—one (the type) from Lawrence, Kansas, one from Roxborough, Pennsylvania, and one from Atherton, Missouri. The peculiar transverse rows of short bristles on the hind tibia, which also occur on the basal half of the mid tibia, separates this species from its congeners; besides this feature it has only two scutellar bristles; the hind tibia has one spine at the basal third and one at apex on antero-dorsal surface; and the hind metatarsi have 4–5 setulæ longer than the fringe of bristles similar to those that occur in *erythronota* Strobl. This last feature not in original description. I have seen a male of this species from Fremont, Nebraska (O. A. Johannsen), July 27, 1909.

PARASPINIPHORA ERYTHRONOTA Strobl.

This is a species that in all probability will occur in America. The hind tibia has one spine at the basal third and one at near the apex on the antero-dorsal surface, and three end spurs on the posterior surface. It differs from *multiseriata* in having four scutellar bristles, and in being darker, especially in the color of the abdomen. The neuration is very similar to that of *multiseriata*, but there is no peculiar bristling of the hind and mid tibiæ as in that species.

PARASPINIPHORA SLOSSONÆ, new species.

Plate 35, fig. 1.

Male and Female.—Yellow, shining; frons yellow, the ocellar triangle brown, bristles strong, the center pair of bristles in first row low down close to post-antennals, the outer pair almost in transverse line with the center pair in second row, which are very much lower on frons than the outer pair in same row, antennæ of moderate size, clear yellow, arista dark, pubescent, palpi small, yellow, weakly bristled; thorax with one, or two, pairs of dorso-central bristles, numerous short hairs, and sometimes three indistinct reddish stripes, scutellum with four equal bristles; abdomen with the anterior margins of segments 2–5 more or less black, sometimes broadly so, second segment in male distended laterally and very bristly in both sexes, sixth segment with long preapical bristles, hypopygium shining, yellow, anal protuberance short, blunt, yellow haired, fore and mid tibiæ with the usual spines, hind tibiæ with one spine at basal third, and one at near tip on antero-ventral surface, one at just above middle on nearly the dorsal surface, one at above middle on nearly the ventral surface, and one at near apex on anterior surface, as well as two strong and one weak apical spurs; costa to middle of wing, first division twice as long as

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second, second three times as long as third, fringe short, fourth vein leaving at slightly before fork of third with a distinct bend and running nearly parallel with fifth to near wing tip; halteres yellow.

Length, 3–3½ mm.

Localities.—Type, Mount Washington, New Hampshire (Mrs. A. T. Slosson); Ithaca, New York (O. A. Johannsen).

Type.—Cat. No. 14827, U.S.N.M.

Very similar in some respects to *bergenstammi*, but a bright yellow colored species.

PARASPINIPHORA DORSALIS Becker.

This species has not yet been recorded from America. It resembles *slossonæ*, but has two pairs of dorso-central thoracic bristles; the hypopygium is "mattgeld" not shining; the bristle-like hairs on the second and sixth segments of the abdomen are more noticeable in this species (those are present in nearly all cases where these segments are elongated); the hind tibia has two spines on the antero-dorsal surface one at the basal third and one at near apex and one on the antero-ventral surface at middle, and two end spurs on the posterior side. The neuration is much as in *slossonæ*. The female has also four to five additional spines on hind tibia. In *slossonæ* the female has hind tibia as in male.

PARASPINIPHORA SPINULOSA, new species.

Plate 35, fig. 3.

Male.—Black; frons dull, bristles strong, antennæ brown, large, half as large as the eye, somewhat pointed, arista pubescent, palpi small, brown, weakly bristled, scutellum with four equally strong bristles; abdomen with the second segment slightly elongated, and with a numerous group of hair-like bristles on its lateral margins, sixth segment elongated and with strong hind-marginal hairs, the other segments subequal and not conspicuously haired, hypopygium moderately large, ventrally yellowish, anal protuberance small; legs black, only the knee joints paler, fore and mid tibia with the usual bristles, hind tibia with one ventral spine beyond the middle, four serial spines on antero-dorsal surface and three on postero-ventral surface, the upper being at about basal third; wings smoky, costa to middle of wing, first division one and one-half times as long as other two together, fork of third vein acute, fringe rather long, fourth vein leaving third at beyond fork with a curve and running nearly straight to near the wing tip, seventh vein complete; halteres yellow.

Length, 3 mm.

Type.—Cat. No. 14828, U.S.N.M.

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One male, Ithaca, New York, April, 1900 (O. A. Johannsen).

Nearly related to *spinosissima* Strobl, but the presence of the ventral hind tibial spine and the absence of the additional mid tibial spines will separate it at once. Its black color and spinulose hind tibia will separate it from any described species.

Genus DOHRNIPHORA Dahl.

In my paper on the subgenera in *Phora*[1] I left the species I now include in this subgenus in *Phora* Latreille, which is not tenable, but at that time I did not consider the *concinna* group as congeneric with *dohrni* Dahl. Kertesz includes *incisuralis*[2] Loew, *venusta* Coquillett, and *divaricata* Aldrich in *Dohrniphora*, which was created for the reception of *dohrni* by Dahl[3] in 1898. It is evident that those species I now include in this subgenus are very closely allied to *dohrni*, and I am therefore placing them all in *Dohrniphora*.

TABLE OF SPECIES.

1. Species with distinct large spines on hind tibiæ in addition to the series of small hair-like setulæ.....2.
   Species without any large spines on hind tibiæ, at most some short setulæ on antero-dorsal or antero-ventral surface.....3.
2. Halteres black, thin veins complete.....*abdominalis*, p. 430.
   Halteres yellow, thin veins not reaching the wing margin.....*abbreviata*, p. 431.
3. Entirely black species, at most the knee joints or fore tibiæ brownish yellow....4.
   Species mostly yellow, at most the thorax brownish[4].....6.
4. Hind tibiæ with short setulæ on one or both anterior surfaces.....5.
   No setulæ on either anterior surface of hind tibiæ.....*knabi*, p. 431.
5. Large species 2½–3½ mm. third antennal joint large and pear-shaped in male; 4–5 setulæ on antero-dorsal surface in addition to the 4–5 on antero-ventral surface. *crassicornis*, p. 431.
   Smaller species 1½–2½ mm. third antennal joint in male normal; only the antero-ventral hind tibial setulæ present.....*concinna*, p. 431.
6. Larger species 2–3 mm; hind tibiæ with 4–5 serial setulæ on antero-dorsal surface. *incisuralis*, p. 432.
   Smaller species 1½–2½ mm; hind tibiæ with setulæ on antero-dorsal surface *venusta*, p. 432.

DOHRNIPHORA ABDOMINALIS Fallen.

A large species, the female being very conspicuous with its red abdomen. The male is entirely black, though it is said to have the abdomen sometimes partly black in Europe (Schiner). The complete wing veins, black halteres, and presence of only two hind tibial spines distinguishes it from *abbreviata* von Roser. It is very probable that this species occurs in America though so far not recorded.

[1] Journ. Nat. Hist. Soc., Glasgow, 1909.
[2] Cat. Dipt., vol. 7, 1910, p. 398.
[3] Sitsb. Ges. Nature Freunde, Berlin.
[4] *D. venusta* and the male of *incisuralis* are sometimes very dark, but the legs and lower parts of pleuræ as well as the hind margins of abdominal segments are yellow.

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DOHRNIPHORA ABBREVIATA von Roser.

A very scarce species, easily recognized by the abbreviated wing veins. The hind tibiæ have three serial spines, the lower one being just below the middle. Not recorded from America.

DOHRNIPHORA CRASSICORNIS Meigen.

Very similar to *concinna* Meigen, but easily known by the characters mentioned in table [1] from that species. Recorded from America.

DOHRNIPHORA CONCINNA Meigen.

With *venusta* Coquillett the smallest species of the genus and generally distributed over North America and Europe. Black, more or less shining; halteres pale, or dark, irrespective of sex, very variable in this respect; hind tibiæ with only 4-5 antero-ventral setulæ. This is the species Aldrich described as *P. cimbicis*, and which stands also in the American list as *nitidifrons* Brues. I have examined the types of both those species and can not find any difference from European examples of *concinna*.

Localities.—Brookings, South Dakota; San Mateo County, California (Baker); New Bedford, Massachusetts (Hough); Ithaca, New York; Beverly, Massachusetts.

DOHRNIPHORA KNABI, new species.

Black, shining; frons glossy black, with numerous weak hairs in addition to the usual bristles, post-antennal bristles strong, first row of bristles slightly convex, second row distinctly concave, the outer pair being placed much lower on frons than the center pair, no distinct ocellar tubercule, vertex slightly raised, antennæ large, nearly round, brownish in color, arista nearly bare, palpi brown, large, protruding, moderately bristled; thorax shining black, covered with short hairs, four scutellar bristles, anterior pair rather weak; abdomen dull black, second, and sixth segments elongated, abdomen nearly devoid of hairs, hypopygium large, ventral processes knob-like, brownish, anal protuberance dusky yellow, long and broad, with numerous short hairs; legs brown, the anterior pair yellowish, fore tibiæ with serial row of 5 setulæ on postero-dorsal surface, the usual two spines on mid tibiæ at very near the base, apical one very weak, hind tibiæ without distinct setulæ, except one at tip on dorsal surface and the usual end spurs; wings grayish, costa to very slightly beyond middle, thickest on basal two thirds, first division about five times as long as other two together, third about one-third as long as second, fringe barely longer than diameter of costal vein, angle of fork of third vein very acute, fourth vein regularly arched; halteres black.

[1] Brues, Gen. Ins., 1906.

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Length, 2½ mm.

Type.—Cat. No. 14829, U.S.N.M.

One male Cabima, Panama, May 18, 1911 (A. Busck).

I have named this species in honor of Mr. F. Knab, to whom I am indebted for many kindnesses and assistance in my work here, and who turned over this specimen to me for determination.

DOHRNIPHORA INCISURALIS Loew.

A very distinct, large species, represented in the collection by two specimens. Its yellow color separates it from any of the foregoing, and the hind tibial setulæ from *venusta* Coquillett.

Localities.—Tifton, Georgia, Oct. 17, 1896; and Great Falls, Virginia, June 25, 1909. Two specimens occurred at Plummers Island, Maryland, August, 1912 (H. S. Barber), and one male September 1, 1912, Hyattsville, Maryland (Malloch and Knab).

DOHRNIPHORA VENUSTA Coquillett.

This species was described by Coquillett,[1] and the rather defective description evidently misled Aldrich into describing it as new under the name *divaricata*,[2] or possibly he had not then seen the description. Later Brues incorporated the species in his Monograph,[3] without having seen the specimen, and simply copied Coquillett's description. Fortunately the type is still in existence and I have no hesitation in deciding that it is identical with *divaricata* Aldrich. Had the type not existed there would, I am afraid, have been another unrecognizable species, added to the already large number in this family. Its yellow color separates it from the first five species, and the small size of the anterior pair of scutellar bristles, and absence of any setulæ on the anterior surface of the hind tibia separate it from any of its congeners except *knabi*.

From a large number of localities.

Type.—Boston, Massachusetts (a male and not female as described by Coquillett); Washington, District of Columbia; bred from cow peas (Chittenden); St. Vincent, West Indies (the types of Aldrich's *divaricata*); Florida (Mrs. Slosson); Brownsville, Texas (Barber); Orlando, Florida (Chittenden, Russell collector); Grenada and Trinidad, West Indies (A. Busck); and several without locality labels.

DOHRNIPHORA VENUSTA, var. BUSCKI, new variety.

This variety has the thorax and abdomen black brown, the face brown, the arista more distinctly pubescent than type and the halteres brown. There is not enough material to decide whether it

[1] Can. Ent., vol. 27, 1895, p. 107.
[2] Trans. Amer. Ent. Soc., vol. 20.
[3] Trans. Ent. Soc. London, pt. 3, 1896, p. 437.

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is really a distinct species. Two specimens, male and female Cabima, Panama, May 11 (Busck).

Type.—Cat. No. 14830, U.S.N.M.

Genus HYPOCERA Lioy.

TABLE OF SPECIES.

1. First vein remarkably swollen at tip and prolonged to tip of third vein; seventh vein obsolete; two scutellar bristles.....*difformis*, p. 433.
   First vein not remarkably swollen ending clear of third..... 2.
2. Vertex semicircularly elevated and sharp above..... 3.
   Vertex not so raised..... 4.
3. Antennæ and palpi black.....*coronata*, p. 434.
   Antennæ and palpi yellow.....*johnsoni*, p. 434.
4. Ocellar triangle raised, hump-like..... 5.
   Ocellar triangle not raised..... 7.
5. Third joint of antennæ yellow.....*bernuthi*, p. 434.
   Third joint of antennæ black..... 6.
6. Fore tibia with a serial row of two to four spines.....*incrassata*, p. 434.
   Fore tibia with one spine.....*carinifrons*, p. 434.
7. Third vein with four to five strong bristles at base, subapical spine on mid tibia at apical third.....*mordellaria*, p. 434.
   Third vein with only one strong bristle at base, or the bristels hair-like, or the whole vein short haired, the subapical spine on mid tibia at near apex.... 8.
8. Hind tibia with one or more spines, other than those at apex..... 9.
   Hind tibia without spines, except at apex..... 13.
9. Costa very thick, wings long and narrow, thin veins straight execpt at extreme apex.....*convergens*, p. 435.
   Costa not remarkably thick, fourth veih curved at base..... 10.
10. Small species, about 1½ mm. or less ..... 11.
    Larger species, at least 2.5 mm..... 12.
11. Entirely black species, generally the front tibia only piceous, wings limpid. *vitripennis*, p. 434.
    Thorax and abdomen more or less yellowish, legs yellow; wings hyaline. *grenadensis*, p. 434.
12. Antennæ and palpi black.....*flavimana*, p. 434.
    Antennæ and palpi yellowish.....*clavata*, p. 435.
13. Small black species, 1½–2 mm.....*citreiformis*, p. 435.
    Large species, 3½ mm., hind tibia flattened dorsally and with numerous transverse rows of short black bristles.....14.
14. Yellow species.....*rectangulata*, p. 512.
    Deep black species.....*ehrmanni*, p. 435.

The somewhat aberrant species *agilis* Meigen has been placed in the genus by Brues,[1] but, so far as I can see, it can hardly be included, as the fork of the third vein is sometimes distinct. It does not occur in America.

HYPOCERA DIFFORMIS Brues.

This is described from New Guinea. Type in the National Museum of Hungary.

[1] Gen. Ins., p. 6.

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HYPOCERA CORONATA Becker.

This is very similar to *johnsoni* Brues.

HYPOCERA JOHNSONI[1] Brues.

The type of this species is in the United States National Museum collection. Varies from *coronata* only in color of antennæ, and palpi. It may be only a variety of that species, as I can not find that it differs in any other respect. I found a female which I believe to be of this species in the collection from Granada, Nicaragua (Baker). It differs only in having the antennæ of normal size and the costa longer.

Locality.—Riverton, New Jersey.

I have also seen specimens I believe are this species from Japan.

HYPOCERA BERNUTHI Becker, HYPOCERA INCRASSATA Meigen, HYPOCERA CARINIFRONS Meigen.

Are not recorded for America that I know of, though it is more than probable that they occur.

HYPOCERA MORDELLARIA Fallen.

Brues gives this species[2] as recorded by Coquillett. He says he has seen no specimens from America. The specimens that stood as *mordellaria* Fallen are not that species; so it may, unless since recorded, be deleted from the list of American species.

HYPOCERA VITRIPENNIS Meigen.

A small species found about nests of *Bombus* in Europe.

HYPOCERA GRENADENSIS Brues.

Type in United States National Museum collection. Grenada, West Indies; except the above species the smallest in the group.

HYPOCERA FLAVIMANA Meigen, (=FEMORATA Meigen).

This species is well represented in the collection, and I can not satisfactorily separate it from the next species by the characters given by Brues. In the series before me are 14 specimens, and two of them may be considered as answering to the original description of *clavata* Loew more or less satisfactorily. They have the antennæ and palpi pale. Other eight have the palpi more or less yellowish and seem to come between the other two and the four typical *flavimana* in the lot. It is not a satisfactory character upon which to base a specific distinction, and I am inclined to consider those as all one species. However, in view of the fact that I have not seen the type-specimen I can not definitely state that Loew's species and that described by Meigen are the same.

[1] *H. inseparata* Brues I consider as identical with the specimen from Nicaragua in collection.

[2] Trans. Amer. Ent. Soc., vol. 29, p. 356.

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Localities.—Mount Washington, New Hampshire (Mrs. Slosson); White Mountains (Morrison); Washington, District of Columbia (W. L. McAtee); Beverly, Massachusetts (Burgess); Mount Katahdin, Maine, August 19, 1902 (no collector's name).

HYPOCERA CLAVATA, Loew.

There is standing in the collection two specimens from Beverly, Massachusetts (Burgess), one of which bears the label *P. mordellaria* Fallen (Coquillett). These specimens may be the true *clavata* Loew. The palpi are much broader and clear yellow without any distinct bristles, but the antennæ are not yellow, being brown. I can not reconcile these with the rather unsatisfactory descriptions I have of *clavata*, but consider them as more probably representing that described by Loew. It certainly is not *flavimana* Meigen, and if not identical with Loew's species is an undescribed one.

HYPOCERA CITREIFORMIS Becker.

This is not recorded from America.

HYPOCERA RECTANGULATA, new species.

See description among exotic species. (p. 512).

HYPOCERA EHRMANNI Brues.

A very distinct species represented in the collection by the type-specimen from Pittsburgh, Pennsylvania, and three males from Plummers Island, Maryland. The species was described from a female and Brues had some doubt as to its distinction from *johnsoni*. They are, however, quite distinct. I have seen a male of this species from Fort Erie, Ontario (Van Duzee), which, like two of those from Plummers Island, has the antennæ and palpi black.

HYPOCERA CONVERGENS, new species.

Male.—Black; frons shining, as long as wide, both frontal bristles and arista rubbed off so that it is impossible to indicate their character; antennæ brown, third joint very large, pear-shaped, distinctly pointed at apex, palpi small, brown, moderately strongly bristled, thorax shining, four scutellar bristles, anterior pair rather weaker than posterior pair; abdomen rather short but unlike most of the species narrow, second segment not much elongated, hind margins of segments narrowly yellowish, the sixth more broadly so, dorsum distinctly gray-dusted, except on lateral margins, hypopygium large, shining brown, paler below, a flap-like organ on left side low down darker than upper portion and covered with very short pale pubescence, anal organ retracted, legs yellow, the coxæ and all femora except bases and extreme apices brown, fore tibiæ with a rather short spine at above the middle, a longer one below middle and a series of short setulæ on antero-dorsal surface, mid tibiæ with the usual two

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spines at near basal third and one pre-apical spine, hind tibiæ with one long spine at slightly beyond basal third on dorsal surface, one at near apex on antero-dorsal surface, one at nearer to apex on antero-ventral surface and two end spurs, basal hind tarsal joint almost as long as tibiæ, with 4-5 long bristles on ventral surface besides the usual short setulæ and long apical spur; wings gray, more darkened at tip, very narrow and long, costa distinctly short of middle, very much swollen, twice as thick as third vein, humeral vein and all basal portions of the thick veins pale yellow and very indistinct, first costal division twice as long as second, fourth vein almost entirely straight, leaving third at slightly beyond end of first vein and ending with a downward curve at extreme apex very distinctly in front of wing tip, fifth vein almost entirely straight ending with an upward curve at apex just at tip of wing, sixth and seventh veins nearly straight costal fringe of good length, third vein with 2-3 hair-like bristles at base; halteres yellow.

Length, 4 mm.

Type.—Cat. No. 14831, U.S.N.M.

One male. Paraiso, Panama Canal Zone, January 15, 1911 (August Busck). Easily known from any other described species by the nearly straight wing veins, the fourth and fifth of which are abruptly convergent at extreme apices.

Genus CONICERA Meigen.

The species in this genus are in some cases very difficult to separate, especially in the females. In the case of *similis* [1] Haliday and *atra* Meigen the only good distinction lies in the comparative length and breadth of the third antennal joint. In *atra* it is two and a half times as long as its basal breadth, in *similis* one and a half times. They seem, however, to be good species, although very closely allied. The specimens of *atra* in the collection here agree with the European species, but a few from the District of Columbia have the legs much paler than European examples. The specimen standing as *C. atra*, var. *neotropica* Brues, I believe, belongs to a distinct species. The only American species not in table is *kerteszi* Brues from Peru. This has the second and third fore tarsal joints widened and flattened, the hind tibiæ with one spine at middle and another just before the tip, as well as having the fourth vein strongly recurved before its tip. The type is in the National Museum of Hungary in Budapest.

TABLE OF SPECIES.

1. Third antennal joint rather globose at base, produced into a very long narrow point, thickly pubescent on the thin apical portion and reaching beyond vertex. *aldrichi*, p. 437.

[1] *C. similis* is not recorded from America.

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Third antennal joint conical, gradually narrowing to a point, not thickly pubescent, and reaching to vertex or short of it.....2.

2. Second costal division one-half as long as first; wings brownish. *neotropica*, p. 437.
Second costal division one-third as long as first; wings clear..... *atra*, p. 437.

CONICERA ALDRICHI Brues.

Easily distinguished from the other species of the genus by the peculiar third antennal joint, besides having four mid tibial spines—two at basal third, one at apical third, and one at just before apex.

CONICERA NEOTROPICA Brues.

Is very similar to *atra* but larger, the third antennal joint is rather broader, the fore tibia has only one distinct setula near the base and is devoid of the row of serial setulose hairs, present in *atra*, beyond it reaching near to apex, the tibial spines are longer and stronger than in *atra*, especially those on the mid tibia, the costa extends nearer to the wing middle, the first division being only twice as long as the second, the costal fringe is much shorter and closer, having six bristles from end of costa to end of first vein instead of three to four, as in *atra;* the abdomen is also a deep velvety black instead of dull black, and shows distinct narrow pale hind margins to the segments which are not present in *atra*.

Described as a variety of *atra* Meigen, by Brues.[1] Grenada, West Indies.

Type in U. S. National Museum collection. (Cat. No. 7756.)

CONICERA ATRA Meigen.

Common throughout Europe and evidently widely distributed in America. Known in the male sex from all other Phoridæ except the above species by its black color, conical third antennal joint, apical arsita, and unforked third vein.

Localities of specimens examined: District of Columbia, Boston and Horse Neck Beach, Massachusetts; and Ithaca, New York.

Genus PHORA Latreille.

Phora[2] Latreille, Hist. Nat. Crust. et Ins., vol. 3, 1802, p. 464.
Trineura Meigen, Ill. Mag., vol. 2, 1803, p. 276.

I am adopting *Phora* of Latreille for this genus because this name has priority over Meigen's name by one year, and the same species was cited as the type of both.

Brues recognized the fact that Latreille's name had priority over Meigen's, but did not adopt it because of the old established usage of those names for different genera.[3]

[1] Trans. Amer. Ent. Soc., vol. 29, 1903, p. 380.
[2] *Phora* was first used by Latreille in 1796 (Précis, p. 169), but no species was cited for it until 1802, which must be considered as the date of its creation, instead of the earlier one.
[3] Gen. Ins. Phor., 44th fas., 1906, p. 1.

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TABLE OF SPECIES.

1. Hind tibiæ with two bristles on basal half.....*occidentata*, p. 438.
   Hind tibiæ with only one bristle on basal half.....2.
2. Small species, 1½–2 mm.; fore tarsi not distinctly dilated though broader than other tarsi; frons of male parallel-sided.....*aterrima*, p. 439.
   Larger species, at least 2½ mm.; fore tarsi very distinctly dilated; frons of male wider above antennæ than at vertex.....3.
3. Fore tarsal joints 2–5 at least as broad as long; fourth vein much bent at base. *montana*, p. 439.
   Fore tarsal joints all distinctly longer than broad; fourth vein slightly bent at base.....*velutina*, p. 439.

PHORA OCCIDENTATA, new species.

Like the other species of the genus, a deep velvety black, the female less velvety than male, but opaque black, frons nearly parallel-sided in female, in male distinctly broader at above antennæ than at vertex, the third pair of frontal bristles distinctly lower on frons than anterior ocellus in male, less distinctly so in female; thorax with numerous strong lateral bristles, two scutellar bristles; abdomen with second and sixth segments elongated, hypopygium very large and incurved, glossy black, with numerous long hairs, legs black, the fore tibiæ and all tarsi paler, fore tibiæ with distinct hair-like setulæ on antero-dorsal surface, longer on the middle, tarsi much dilated and except at base of metatarsi as broad as tibiæ, similar to those of *velutina*, mid tibæ with two antero-dorsal spines in both sexes, postero-dorsal surface in male with six, in female with three or four spines, the lower one at about two-fifths from apex, and the remaining portion of tibiæ with hair-like setulæ, hind tibiæ with two spines, the smallest at one-fifth from base, the largest at rather more than two-fifths from base, one spine at apex, all on antero-dorsal surface, tip of dorsal surface of tibiæ bare and glossy; wings clear, costa to near middle in male, short of it in female, first division shorter than second in male, as long as second in female, fourth vein slightly bent at base and ending near to wing tip, seventh vein indistinct but complete; halteres black.

Length, 3–5 mm.

Popoff Island, Alaska, July, 1899 (Harriman Exp., Kincaid), labeled *aterrima* Meigen, by Coquillett, and recorded as such in the Papers on the Expedition; White Mountains (Morrison); Kussiloff, Alaska (W. H. Evans); Torrey's Lake, Wyoming (labeled *velutina* Meigen, by Brues); and one specimen evidently of the same species from Los Angeles, California (collection of Coquillett). Possibly this last wrongly labeled as to locality.

Type.—Cat. No. 14832, U.S.N.M.

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PHORA ATERRIMA Meigen.

The smallest species of the genus so far described. The frons of the male is parallel-sided; the thoracic bristles are strong, especially those on near lateral margins of dorsum above wing base, but they are not so numerous laterally as in the larger species, the fore tibiæ have no distinct setulose hairs, though broader than other tarsi the fore pair are narrower than tibiæ, mid tibiæ with one antero-dorsal bristle in both sexes, postero-dorsal surface with four long spines in male and two or three in female; hind tibial bristles at about basal third and apex; wings clear, costa to middle, gradually thickening toward apex, first division distinctly but not greatly longer than second, fringe barely longer than diameter of costal vein, fourth vein slightly curved at base and ending very near to wing tip, halteres black.

Length, 1¼–2 mm.

Two males, Natrona, Pennsylvania, July, 1895 and 1896 (no collector's name). I have also seen it from Chicago, and Ithaca, New York (O. A. Johannsen). Brues records it from Mississippi, Pennsylvania, Kansas, South Dakota, Illinois, Michigan, and Texas.

PHORA MONTANA Brues.

A very distinct large species. There are five or six spines on postero-dorsal surface of mid tibiæ in male and only two in female, the antero-dorsal surface has only one bristle, the hind tibiæ have one bristle; and the base of fourth vein is more distinctly bent than in the other species of the group.

Type-locality, Magdalena Mountains, New Mexico. Types in collection of the U. S. National Museum.

PHORA VELUTINA Meigen.

A common and very widely distributed species. Separable from the above by its having five to seven postero-dorsal mid tibial spines in male and two to three in female; the fourth vein is also less bent at base; the hind tibiæ have only one spine; there are also generally two spines on antero-dorsal surface of mid tibiæ.

Localities.—California, Idaho, Massachusetts, Kansas, Michigan (Brues), Alaska, White Mountains (in collection).

PSEUDOHYPOCERA, new genus.

Head large, frons with two post-antennal, nearly erect bristles, two reclinate bristles nearly in line horizontally with these, all four occupying but little more than one-third the width of the frons and nearly on the front margin, sometimes a very minute pair of bristles is present anterior to the central pair in the female, a second row consisting of two lateral bristles very near to the eye margin and nearly midway to the antero-ocellar row of four, vertical row as in *Aphiochæta;* male antennæ elongate-oval, large, arista subapical, bare,

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female antennæ oval not elongate, clypeus slightly produced in male very much in female, palpi large, male proboscis small, retracted, female proboscis large and fleshy, female ovipositor retracted, male hypopygium retracted, anal protuberance very conspicuous; wings large, third vein forked, mediastinal vein absent, seventh vein incomplete in female, traceable to near margin of wing in male, legs as in *Aphiochæta*, with apical spurs well developed on four posterior tibia.

Type of the Genus.—*Pseudohypocera clypeata*, new species.

PSEUDOHYPOCERA CLYPEATA, new species.

Plate 35, figs. 10–12.

Male and female.—Black; frons glossy black, the bristles rather weak, frontal suture indistinct in male, present in female only as a circular depression behind the post-antennal bristles, ocellar triangle small, antennæ yellow, third joint darkened at apex, rather pointed in male, arista bare, palpi large in both sexes and strongly bristled, clypeus very much produced in female, chitinous, yellow, with a transverse depression above, proboscis in female large, slightly bristly; thorax brownish black, humeri and pleuræ yellowish, about 8 bristles on the posterior margin of thorax besides the dorso-central pair and one pair beyond them forming a continuous row to the prescutellar pair, scutellum very short and broad, at least four times as broad as long, four strong bristles present, second segment of abdomen lengthened, hypopygium of male very inconspicuous, anal protuberance yellow, sixth segment in female with numerous hair-like bristles; wings clear, thick veins yellow or brownish, costa to middle of wing, first division equal to the remainder, humeral vein bent, fork of third vein indistinct, fourth vein leaving third vein with a curve and running in a gentle sweep to very near to wing tip, fifth vein nearly straight, ending much behind wing tip, seventh vein very indistinct, not reaching the wing margin in female but in male traceable to margin, legs yellow, anterior tibiæ with numerous hairs and a row of setulæ on the antero- and postero-dorsal surfaces, all femora distinctly hairy especially on the ventral surfaces, hind tibia with a distinct dorsal ridge, setulæ on postero-dorsal surface hair-like, hind metatarsus with about 10 transverse rows of stiff hair-like bristles; halteres yellow.

Length, 3½–4½ mm.

Type.—Cat. No. 14833, U.S.N.M.

Eighteen specimens, Tabasco, Mexico. Manuscript label "on honey and wax," but no date or collector's name.

A very distinct species not referable to any genus already described. Has much the general appearance of a *Hypocera* but differs from the species in that genus by having no tibial subapical spines, and the third vein being forked.

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Genus BECKERINA[1] Malloch.

TABLE OF SPECIES.

Halteres black, costa but little beyond middle of wing, fringe long.
umbrimargo, p. 441.

Halteres yellow, costa very much beyond middle of wing, fringe very short.
orphnephiloides, p. 441.

BECKERINA UMBRIMARGO Becker.

This species is not recorded from America. These two species may be known by the erect post-antennal bristles from the species included in *Aphiochæta*. There are also other structural differences which caused me to separate the then existing single species from *Aphiochæta* in the paper above mentioned. It is not unlikely that *umbrimargo* will occur in this country. It is not uncommon in Britain and occurs in damp woods. Like the next species it has the mesopleuræ and hind tibia without bristles, has four strong scutellar bristles, and the costa decidedly swollen on the outer half, it is smaller than next species, being 2½ mm.

BECKERINA ORPHNEPHILOIDES, new species.

Plate 36, figs. 8, 10.

Black; head small, frons one and one-half times as broad as long, ocelli rather close together, triangle raised, frontal suture indistinct, bristles strong, post-antennal four erect and in almost a strait line, center pair of bristles in lower row close to post antennal bristles, center pair in second row in line with outer pair in first row, outer pair in second row in usual position in line almost with front ocellus, third joint of antennæ round, pubescent, large, arista pubescent, very long, as long as front tibia, basal joints short, not much swollen; palpi almost as large as antennæ, brown, weakly bristled; thorax brown, pleuræ lighter, two dorso-central bristles, four strong scutellar bristles, mesopleuræ bare, abdomen long and narrow, second segment elongate, with several long hair-like bristles on lateral posterior margins, hypopygium large, central processes lamelliform, anal protuberance small, yellowish; legs very long and slender, femora but little thickened, yellow, the coxæ brown at base, legs almost entirely bare, hind tibiæ with only fine, close-placed hairs, no distinct setulæ, tibial spurs well developed, wings long, costa to two-thirds the wing length, apical two-thirds much swollen, first costal division about equal to second, third one-half as long as second, fringe short and fine, not longer than diameter of costa, fourth vein leaving at midway beyond fork with a distinct curve, and running nearly straight to wing tip, fifth and sixth veins very close together; halteres yellow.

[1] Ann. and Mag. Nat. Hist. (Scot.), 1910, p. 90.

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Length, 5 mm.

Two males November 3, 1906 (A. K. Fisher); 1 female, November 18, 1906 (W. L. McAtee), Plummers Island, Maryland.

Type.—Cat. No. 14834, U.S.N.M.

Genus APOCEPHALUS Coquillett.

TABLE OF SPECIES.

1. The second pair of frontal bristles placed near the center of frons and almost directly in line above the lower pair; ovipositor of female parallel-sided for about its basal half, then narrowing into an obliquely pointed apical fourth. *wheeleri*, p. 442.
   The second pair of frontal bristles placed near the eye margins and not nearly straight above lower pair.....2.
2. Costa distinctly short of the wing middle, fringe long and sparse, fork of third vein indistinct; nearly coalescent with the apex of third, ovipositor of female parallel-sided at base, contracted at tip third and with two bristle-like projecting organs at tip.....*spinicosta*, p. 442.
   Costa to about wing middle, fringe short and delicate.....3.
3. Ovipositor spatulate at tip.....*coquilletti*, p. 443.
   Ovipositor not spatulate at tip.....4.
4. Ovipositor about one-half as broad at its broadest part as long.....*pergandei*, p. 443.
   Ovipositor about one-third as broad at its broadest part as long.....*similis*, p. 444.

With the exception of three males in the United States National Museum collection none of the species are known in that sex. That the last three species are closely allied there can be no doubt, but I am quite certain they are not varieties of one species.

APOCEPHALUS WHEELERI Brues.

Plate 38, figs. 1, 5, 9.

The type-specimen of this species is in the collection. Quite distinct from any of the other recorded species. In this species the arista is apical.

APOCEPHALUS SPINICOSTA, new species.

Plate 38, figs. 2, 8, 11.

A single specimen of this very pretty species standing unidentified in the collection. In the position of the frontal bristles it resembles the next three species, but in other respects it is very different.

Description: Yellow; frons black, bristles as in *pergandei* Coquillett; antennæ yellow, third joint nearly round, arista dorsal rather thick and short, not longer than frons; palpi yellow, weakly bristled; thorax clear yellow, scutellum with only two apparent strong bristles, abdomen brown, only the basal segment yellowish, very narrow, second segment the longest; no distinct bristles except on the sixth where they are very strong, ovipositor highly polished, parallel-sided

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on basal two-thirds, then narrowed to apex which is truncate, the two projecting organs giving it an acutely pointed appearance; legs yellow, spurs on posterior four tibiæ minute, of equal length on both pairs; hind femora with a fringe of soft hairs on their ventral surface; hind tibia delicately setulose; wings with the costa decidedly short of middle, first section about three times as long as second, fork of third vein hardly visible except with a high power, fringe very long on tip half of costa, short at base, consisting of about 10 bristles; fourth vein leaving third with a hardly preceptable curve running nearly straight to tip of wing, ending with a slight downward curve, seventh vein distinct; halteres yellow.

Length, 1½ mm.

Localities.—Brownsville, Texas, May 7, 1904 (H. S. Barber). A manuscript label, "Flying erratically over ants, Esperanzo Ranch 7–5" is also on the pin, but no note of the species of ant it was attending.

Type.—Cat. No. 14835, U.S.N.M.

APOCEPHALUS COQUILLETTI, new species.

Plate 38, fig. 4.

This is the species Brues described and figured as *pergandei* Coquillett.[1] It is quite distinct in the shape of the ovipositor from that species which is correctly figured and described by Coquillett,[2] and to Brues's description I would only add that like *pergandei* it has four scutellar bristles, the anterior pair much reduced and the spurs on the hind tibiæ are only half as long as those on the mid tibiæ. I found a single specimen in the collection here with the manuscript labels "5415, chasing *Camponotus*" and "*Phora* sp.?" On reference being made to the diary it was discovered that the specimen was received June 8, 1912, from P. C. Newkirk, Jalapa, Tennessee. I have seen the specimen mentioned by Brues from Frankford, Pennsylvania, with specimen of *C. pennsylvanicus* on card, and it is identical with that from Tennessee. I accordingly have named this species *coquilletti* in honor of the late Mr. D. W. Coquillett, who first described the genus. Brues records the Texan specimen as attacking *Camponotus maculatus*, var *sansabeanus* Buckley.

Type.—Cat. No. 14836, U.S.N.M.

APOCEPHALUS PERGANDEI Coquillett.

Plate 38, figs. 3, 6, 10, and plate 41, fig. 6.

This species is represented in the collection by eight specimens, five, from which the original description was drawn, with the locality, Cabin John Bridge, Maryland, and three from Washington, District

[1] Trans. Amer. Ent. Soc., vol. 29, p. 373.

[2] Proc. Ent. Soc. Wash., vol. 4, 1901, p. 501.

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of Columbia. The species attacks *Camponotus pennsylvanicus*. I have also seen one specimen from Cranmoor, Wisconsin. June 12, 1910 (C. W. Hooker).

APOCEPHALUS SIMILIS, new species.

Plate 38, figs. 7, 12, 13.

This is similar in practically all respects to the above species, but differs in having the ovipositor of the female much narrower at base than in *pergandei*. In every other respect it agrees with this species and I should have considered it as only a variety of *pergandei* had it not been for the constancy of the form of the ovipositor in the series of that species before me, and the fact that it came from a widely different locality—Madero Canyon, San Rita Mountains, in Arizona, and attacks a species of *Camponotus* which, while unable to decide exactly what it is, Mr. Rohwer assures me is not *pennsylvanicus*.

I have hesitated to tabulate the males of this genus, as it is difficult to assign them to the proper species without their being taken at the same time and place, none of this sex having been previously described. However, I have obtained three specimens that represent different species and consider that it may be better to indicate their characters so far as my limited material will permit.

TABLE OF MALES.

1. Halteres black, small species, under 1 mm ..... *aridus*, p. 444.
   Halteres yellow, larger species, 1½–2 mm ..... 2.
2. Third costal division one-third as long as second, 10–11 costal bristles from end of first vein to end of costa ..... *pergandei*, p. 443.
   Third costal division one-half as long as second, 6–7 costal bristles from end of first vein to end of costa ..... ? *similis*, p. 444.

APOCEPHALUS ARIDUS, new species.

Plate 41, fig. 7.

Male.—This species is easily known from the others in the genus by its comparatively small size. Yellow-brown, subshining; frons distinctly shining, about as long as broad, second pair of bristles as in *pergandei* Coquillett, antennæ yellowish-brown, third joint not elongated as in other species but almost round, of rather small size, arista thick and short, not longer than breadth of frons, nearly bare, mesopleuræ bare, anterior scutellar bristles very minute, lower part of pleuræ yellow; abdomen dark brown, second segment elongate, third to fifth gradually decreasing in size, sixth elongated, hypopygium yellow, glossy, large, globular, ventral processes large, protruding, anal protuberance very long, with two terminal hairs; legs entirely yellow, hind tibial ridge pronounced, the setulæ weak and widely placed; wings rather broad, costa to short of middle, first division distinctly but not greatly longer than other two together, third division about one-third as long

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as second, fringe rather short and sparse—five bristles between end of first vein and end of costa—fourth vein leaving at beyond fork, regularly arcuate and ending distinctly in front of tip of wing; halteres black.

Length, barely 1 mm.

One specimen Córdoba, Vera Cruz, Mexico, April 20, 1908 (Dr. A. Fenyes).

Type.—Cat. No. 14838, U.S.N.M.

A comparison of the figures of this and the other two species will serve to distinguish them. The anal protuberance in figure 12, Plate 38, is turned ventral surface out and in normal situation is much as figured on Plate 41, figure 5.

Genus APHIOCHÆTA Brues.

TABLE OF GROUPS.

1. Wings with a distinct spot-like brown patch between the fourth and fifth veins at tip.....Group A, p. 445.
   Wings without any spot-like darkening at tip.....2.
2. Front tarsi dilated, short, the metatarsi as thick as tibiæ at tip....Group B, p. 446.
   Front tarsi not noticeably thickened, the metatarsi always thinner than the tibiæ at tip.....3.
3. Hind tibiæ with two rows of setulæ—one on the antero, and one on the postero-dorsal surfaces.....Group C, p. 447.
   Hind tibiæ with only one row—that on the postero-dorsal surface—or setulæ indistinct.....Group D, p. 452.

Genus APHIOCHÆTA, Group A.

APHIOCHÆTA CONGLOMERATA, new species.

Male.—Black, hardly shining; frontal bristles strong, antennæ brownish, palpi yellow, rather strongly bristled; dorso-central bristles on thorax small, scutellum with two strong bristles and two minute hairs anterior to them; abdomen weakly bristled laterally on second segment, segments of nearly equal length, hypophygium large, anal protuberance brown, with a few hairs; mesopleura weakly bristled, halteres black, legs brownish yellow, the hind pair darker, hind tibia finely setulose; wings grayish, tip narrowly brownish on anterior margin and a rounded patch between the fourth and fifth veins of the same color, this darkening is caused by the approximation of the very minute hairs on the surface of the wings and is quite distinct from any thickening or darkening of the membrane of the wing; costa to the middle, first section slightly longer than the remaining portion, third section about one-third as long as second, fringe very long and widely placed, each side consisting of about 13 to 14 bristles, fourth vein leaving at fork of third with a gentle curve and running nearly straight to near the tip of wing, seventh vein distinct, halteres black.

Length, 2 mm.

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Locality.—Kaslo, British Columbia (A. N. Caudell), one male.
Type.—Cat. No. 14839, U.S.N.M.

I know of no species of *Aphiochæta* with the wing tip darkened as here. It is a very distinct insect allied to *agarici* Lintner, but the characters given in description should separate it from any described species.

Genus APHIOCHÆTA, Group B.

TABLE OF SPECIES.

1. First costal division only about as long as second, and decidedly shorter than second and third together; male palpi dilated, costal fringe very short. *magnipalpis*, p. 446.
   First costal division at least one and one-half times as long as second, and as long as, or longer than, second and third together, costal fringe of moderate length..2.
2. Male palpi dilated and almost bare, first costal division in male about twice as long as second, in female about one and one-half times as long, halteres clear yellow. *projecta*, p. 446.
   Male palpi normal, and rather strongly bristled; first costal division three times as long as second; halteres brown ..... *californiensis*, p. 447.

APHIOCHÆTA MAGNIPALPIS Aldrich.

This was originally described [1] from specimens taken in St. Vincent, West Indies. The description there given is too brief to identify the species if any closely allied forms are found, as no mention is made of most of the principal characters by means of which the species in this group are generally separated. Brues in redescribing it gives the scutellar bristles as two, though the table gives it as belonging to the four-bristled group, and in neither description is there any mention of the dilated fore metatarsi. The costa is extremely fine fringed and the hairs on the arista are very distinct, being more easily seen than the costal fringe, the hind tibia is destitute of distinct setulæ, having only weak hairs on the postero-dorsal surface, and the scutellum has four distinct bristles. There are two specimens (the types) in the collection representing both sexes. They are not in very good condition, but they seem to have the mesopleura bare.

APHIOCHÆTA PROJECTA Becker.

I find a male of this species and what is very probably a female also in the collection from White Mountains, New Hampshire (Morrison). It has not been previously noticed, so far as I am aware, from this country though it is a very common European species, and is attached to fungi in Britain. It may be known in the male sex by the large projecting palpi, and in both sexes by having four strong post-antennal proclinate bristles, mesopleuræ with several bristles, four scutellar bristles, costa to slightly beyond middle of wing, long fringed, halteres yellow, fore tarsi distinctly thickened, the metatarsi being

[1] Trans. Lond. Ent. Soc., 1906, p. 438.

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as thick as the tibia; the legs all yellow, hind femora fringed at base with rather long soft hairs, hind tibiæ distinctly, but finely setulose on postero-dorsal surface.

Length, 2½ mm.

One male taken in U. S. National Museum, Sept. 3, 1912, evidently belongs to this species, though the fore tarsi are both broken off. (H. L. Viereck.)

APHIOCHÆTA CALIFORNIENSIS, new species.

Male and female.—Brownish black; frontal bristles strong, post-antennal bristles of almost equal size; antennæ brown, rather large, aresta slightly pubescent, palpi yellow, normal size, strongly bristled, mesopleura bristly, scutellum with four equally strong bristles, halteres brown, second abdominal segment but little longer than third, not noticeably bristled laterally, anal protuberance of male brown, small, ovipositor of female not exserted, inconspicuous, wings fuscous, veins brown, costa fully to middle of wing, first division at least three times as long as second, fringe of moderate length, fine, and rather loose, legs brownish yellow, fore legs paler, fore tarsi thickened, metatarsi rather wider than tibiæ, hind tibiæ ciliated on postero-dorsal surface with very weak setulæ.

Length, 2 mm.

This species is very distinct from the other two in this group in color, neuration, and in having the metatarsi more dilated than in either. The only other species that it can be confounded with is *palmeni* Becker, but that species has the antennæ very much enlarged, conical, and almost as large as the eye in the male.

One male, one female, Fieldbrook, Humboldt County, California, May 30, 1903 (H. S. Barber). Mounted on same card. Standing among the duplicates of *A. rufipes* Meigen.

Type.—Cat. No. 14840, U.S.N.M.

Genus APHIOCHÆTA, Group C.

TABLE OF SPECIES.

1. Frons very narrow, twice as long as broad, highly polished, and punctured....2.
   Frons about one-half longer than its breadth, the post antennal bristles very small....3.
   Frons but little if any longer than broad, the post-antennal bristles large....5.
2. Scutellar bristles of equal size, hind margin of throax and base of scutellum black. *longifrons*, p. 449.
   Anterior pair of scutellar bristles much reduced in size, throax and scutellum yellow. *epeiræ*, p. 450.
3. First section of costa about equal to the other two together; entirely black except legs. *halictorum*, p. 450.
   First section of costa much longer than the other two together; or species mostly yellow....4.

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4. Costa about two-fifths the length of the wing; hind tibia entirely yellow. *fasciata*, p. 448.
   Costa longer, but not reaching middle of wing, hind tibia black at apex posteriorly. *nedæ*, p. 448.
5. First costal division at most one and one-half times as long as the second; species mostly yellow with black marks on abdominal segments.....6.
   First costal division twice as long as second, species with at most the thorax reddish, and whitish or yellowish marks on abdomen.....7.
6. First division of costa shorter, or only as long as second.....*subpicta*, p. 452.
   First division of costa one and one-half times as long as second.....*picta*, p. 451.
7. Humeri and postalar calli yellow, hind margins of abdominal segments narrowly yellowish.....*barberi*, p. 450.
   Thorax sometimes reddish, abdomen black with male hypogium and female ovipositor whitish, a yellow streak over insertion of antennæ on frons. *giraudii*, p. 451.

APHIOCHÆTA FASCIATA Fallen.

A species represented in the collection by two specimens from Malaga, Spain; the species standing as *fasiata* being that described below. The costa in *fasciata* only reaches to about two-fifths of the wing length, the first division being more than twice as long as the remainder; the frons is rather longer than broad, the post-antennal pair of bristles are very small, the third joint of antennæ is large and oval, the arista is short, the abdomen in male is all black except the basal segment, and sometimes the apical two slightly, and the venter which are yellow; the antero-dorsal bristles on hind tibia are on basal half only, hind metatarsi as thick as tibia, rather more thickened in female than in male. Schiner mentions that this species is parasitic on *Coccinella* species. The species recorded by Aldrich[1] could not have been *fasciata* Fallen, as it is a much smaller insect than *picta* Lehm, whereas he says his specimens were on the average larger.

I have seen one of the specimens named for Mrs. Slosson by Coquillett as *fasciata* and find that it is *epeiræ* Brues. This name, like *giraudii* Egger, had better be removed from list of American species.

APHIOCHÆTA NEDÆ, new species.

Very similar to *fasciata* Fallen, but in color it is brighter, and in size rather larger than that species. The principal distinctions are: Head, thorax, and abdomen yellow, except the ocellar triangle, and triangular patches on the lateral margins of segments three and four, in both sexes, which are black; the post-antennal bristles are very small but both pairs are present; there are two very fine hairs anterior to the usual two scutellar bristles; the costa reaches to short of the wing middle, but is longer than in *fasciata*, the cells between the thick veins are broader; the legs are yellow except

[1] Trans. Lond. Ent. Soc., 1896, p. 436.

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the mid-tarsi which are dusky and the tip of the posterior surface of hind tibia and metatarsi which are glossy black, last four joints of tarsi dusky; setæ on antero-dorsal surface of hind tibia extending to two-thirds of length of tibia, metatarsi not as broad at tibiæ.

Type.—Cat. No. 14841, U.S.N.M.

Two males and two females, Oaxaca, Mexico (Koebele). "Bred from *Neda marginata.*" *N. marginata* Linnæus is a Brazilian beetle and *N. marginalis* Mulsant is Mexican.

It is possible that an error in the name has been made here which can only be determined by an examination of specimens of the host.

APHIOCHÆTA LONGIFRONS Brues.

Yellow; frons long and narrow, shining, punctured, about twice as long as broad, post-antennal bristles very minute, other bristles large, arranged in lateral rows of four about equidistant at close to the eye margins, and two almost immediately behind and two rather farther in front of the ocelli, which are black; antennæ yellow, small, round, half hidden in cavity, arista yellow at base, nearly bare; palpi small, pale yellow, weakly bristled; dorsum of thorax posteriorly narrowly suffused with black extending along the sides to in front of base of wing where it is most distinct and continuing posteriorly in a streak down over the pleuræ to behind wing base; scutellum blackened at base, posteriorly pale yellow, four strong bristles present; abdomen yellow, segments 1–4 with lateral triangular black patches continued across on segments 1–3 in a narrowing band, fifth segment yellow, sixth yellow at base, apical four-fifths glossy black, ovipositor exserted, glossy black, much as in genus *Apocephalus* Coquillett, mesopleuræ bare; legs yellow, tarsi darker, hind femora with apex broadly black, all tibiæ with two serial rows of setulæ on the antero- and postero-dorsal surfaces, those in the postero-dorsal surface of hind tibia (9–10) very stong; wings narrow, grayish, veins brown, costa to middle, first division rather longer than the other two together, angle at which veins join costa very acute, and cells inclosed by those veins narrow, costal fringe fine, rather short, and close, fourth vein leaving third at fork with a gentle curve and running straight to margin of wing at considerably in front of tip; halteres yellow.

Length, 3 mm.

One female, Plummers Island, Maryland, Sept. 8, 1909 (W. L. McAtee). I have also seen 1 male and 1 female from Ithaca, New York (O. A. Johannsen). A close ally of *epeiræ* Brues. Described by Brues from Milwaukee, Wisconsin (1906), (male only). The male has the apical third of wing infuscated and in other respects differs somewhat from the description given above. The Milwaukee specimens were taken hovering about the burrows of *Tremex columba*, where *Thalessa lunator* and *T. atrata* were ovipositing.

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APHIOCHÆTA EPEIRÆ Brues.

A very distinct species allied to the above in the form and bristling of frons. The thorax and scutellum are entirely yellow, and the abdomen has generally four black spots, two each on the lateral surfaces of the first and second segments; a tuft of black bristles is situated in the center of the black part on second segment; the hind femora are entirely yellow; the costa in middle is distinctly dilated and yellow, whereas in the foregoing species it is not swollen at this part and is black-brown; it is also a rather smaller species, and the anterior pair of scutellar bristles are greatly reduced. The mesopleura has some short bristles, and one very long and conspicuous one high up on the posterior margin, which is sometimes duplicated. Represented by a large number of specimens in the collection from the District of Columbia; Mount Washington, New Hampshire; Rock Ledge, Florida; and Twining City, Maryland. Bred from spiders' eggs.

APHIOCHÆTA HALICTORUM Melander and Brues.

I have not seen this species, but it is evidently quite a distinct species judging from the description given by Brues. It is the only black species in the group. Allied to *fasciata* Fallen, and *longifrons* Brues, in neuration; it is separated by color characters and also by its having four scutellar bristles. The costa reaches nearly to the middle of the wing, but the first division is only a little longer than the second and not longer than the second and third together.

APHIOCHÆTA BARBERI, new species.

Plate 36, fig. 7.

Allied to the above, but larger and with several characters by which it may be easily separated from it. Description: Brownish-black; frons black, both pairs of post-antennal bristles very strong, the upper pair more widely placed than the central pair in front of ocelli, ocelli raised, frontal suture distinct, antennæ moderately large, brown, arista long, nearly bare, palpi clear yellow, large, and strongly bristled (5–6); thorax brown, postalar celli and humeri yellow, mesopleuræ bare, one pair of dorso-central bristles, four equally strong scutellar bristles; abdomen brownish black, hind margins of segments narrowly yellow, second segment lengthened, laterally dilated at middle, and with a group of bristles (5–6) on the projecting part; legs and coxæ yellow, the apex of hind femora broadly brown, hind tibia and tarsi dusky, mid tibia with a row of serial, rather short but strong bristles on the dorsal surfaces for two-thirds of their length, apical third of anterior surface clothed with

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short, closely placed, strong hairs; hind femora strong, hind tibia with the row of bristles on the antero-dorsal surface confined to the basal half (4–5), those on the postero-dorsal surface (9–10) long and strong; costa to about middle of wing, first division equal to the other two together, fringe moderately long; fourth vein leaving the third with a gentle curve and running with a slight upward curve to much in front of the wing tip, where it recurves and runs somewhat obsoletely along the margin of wing to nearer the tip; halteres yellow.

Length, 3 mm. One male, one female, Las Vegas, New Mexico (August 14, 1901), H. S. Barber.

This very distinct species comes nearest to *halictorum* Melander and Brues, but there should be no difficulty in separating the two.

Type.—Cat. No. 14842, U.S.N.M.

APHIOCHÆTA GIRAUDII Egger.

Recorded as American, but those specimens standing as such in the collection[1] are widely different from the European species. The typical *giraudii* is 2–2½ mm. in length; those specimens are 1–1¼ mm. In no respect do they agree with the description of the species they are standing as. The European insect is very variable in color. The thorax and abdomen are generally black, though the former is sometimes reddish or yellow; the frons is gray with a yellowish band above the insertion of the antennæ, the antennæ are black, though in the female the third joint is sometimes orange; the male hypopygium is mostly whitish, and the ovipositor is whitish in the female, showing a marked contrast with the black abdomen. I have not seen American representatives of this species, and have been unable to find the specimens on which Coquillett based his determination. It had better be consigned to the list of unrecorded or doubtful species.

APHIOCHÆTA PICTA Lehm.

Plate 36, fig. 1.

A species closely allied to *scalaris* Loew, but easily separated by the presence of the row of setulæ on the antero-dorsal surface of the hind tibia. The two specimens in the collection are in all respects identical with European examples, except that the anterior pair of scutellar bristles are rather weaker. In Brues's paper he omits any mention of the triangular black lateral patches on the abdomen in this species. The first section of the costa is as long as the other two together. The frontal bristles are arranged as in sketch. The mesopleura is bare, the frons, thorax, and abdomen are yellow, the latter with fore-marginal black bands which are triangularly dilated laterally; sometimes nearly the whole segment is suffused except the hind margin; the sixth

[1] *A. chaetoneura*, new species, p. 490.

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segment is usually entirely black; there is also a black spot on the pleuræ between the wing base and another on the posterior surface of the mid coxæ; hind femora dilated, apices black, halteres entirely yellow.

One specimen, Plummers Island, Maryland, April 26, 1908 (W. L. McAtee), and one, White Mountains, New Hampshire (Morrison).

APHIOCHÆTA SUBPICTA, new species.

Plate 36, fig. 3.

This is very closely allied to *picta* Lehm., and also to *scalaris* Loew.

Female.—Head, thorax, and abdomen yellow, the latter with hind marginal bands dilated laterally on each segment, frontal bristles arranged as in sketch, frons rather narrowed in front, scutellum with four equally strong marginal bristles, mesopleura bare, a black spot on the posterior surface of mid coxæ, hind femora as in *picta*, hind tibial antero-dorsal bristles distinct on basal two-thirds, second abdominal segment long, dilated laterally and with a row of about six strong bristles on the lateral surface, costa to well beyond the middle of wing, first section shorter than the second, fringe moderately long and close, fourth vein leaving at fork of third with a gentle curve and reaching margin at well in front of the tip of wing, halteres infuscated at tip.

Length, 2½ mm. A single female from Biscayne Bay, Florida (Mrs. A. T. Slosson).

This species is very like *scalaris* Loew, but the hind tibia has only one row of setulæ in *scalaris*, that on the postero-dorsal surface.

Type.—Cat. No. 14843, U.S.N.M.

Genus APHIOCHÆTA, Group D.

TABLE OF SPECIES.

1. Scutellum with four bristles and mesopleura with a group of numerous bristles on the upper posterior angle. (In *macrochæta* and *spinifemorata* there are only sometimes one or two small indistinct hairs besides the large bristle present, and the anterior scutellar bristles are mere hairs.).....2.
   Scutellum with four or two bristles, but if the mesopleura is bristly as in above species then only two scutellar bristles are present.....7.
2. One very long and strong backwardly directed bristle besides the numerous smaller bristles on mesopleura (conf. *monochæta* and *spinifemorata*).....3.
   Mesopleural bristles irregular—two or three of those on the posterior margin rather larger in size—black species .....*arcuata*, p. 460.
   Mesopleural bristles all small, and of nearly equal size; yellow species.....6.
3. Black species; only the hind margins of the abdominal segments narrowly, and the legs yellow.....4.
   Yellow species; thorax and frons entirely yellow, abdomen more or less yellow..5.
4. Frons broader than long, center pair of bristles in first row very little lower on frons than outer pair, arista distinctly longer than frons .....*marginalis*, p. 457.

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Frons distinctly longer than broad, center pair of bristles much lower on frons than outer pair which are not very close to eye-margin, arista only at most as long as frons.....*submarginalis*, p. 458.

5. Hind tibial cilia (7–8) very weak.....*juli*, p. 459.
Hind tibial cilia (12–13) strong.....*perdita*, p. 459.

6. Antennæ brown-black, scutellar bristles of equal size, arista thin and much longer than frons.....*nigriceps*, p. 460.
Antennæ yellow, arista short and thick, barely as long as frons, anterior scutellar bristles much reduced in size.....*winnemana*, p. 461.

7. Thorax[1] wholly and abdomen wholly or partly yellow. If there should be any doubt as to whether a species falls into this section it may be decided by an examination of the pleuræ; which in this group is always yellow, being lighter in color as a general rule than the dorsum.).....8.
Thorax black or brown, abdomen black or brown, with only the hind margins of the segments narrowly paler, yellow or whitish.....30.

8. Scutellum with four bristles, the anterior pair being at least half as large as posterior pair in female, but sometimes much reduced in size in male.....9.
Scutellum with only two distinct bristles in female, sometimes two weak hairs may be present but they are always much weaker than one-half the posterior pair, and not bristle-like.....17.

9. First costal division much longer than the second, at least one and one-half times as long, fringe long.....10.
First costal division only about as long as second, never noticeably longer, fringe generally short.....13.

10. Costa distinctly short of wing middle, first division three times as long as second, frons with yellow pubescence anteriorly; small species 1–2 mm...*aletiæ*, p. 462.
Costa to about wing middle, first division about twice as long as second.....11.

11. Female ovipositor exserted, chitinous; third segment of abdomen with a regular preapical row of hair-like bristles, and several on the lateral margins; abdomen conical.....*conica*, p. 462.
Female ovipositor not chitinous, abdomen normal, without noticeable bristles on third segment as in *conica*.....12.

12. Female proboscis large and fleshy, protruding; antennæ yellow, darker at apex. *fisheri*, p. 463.
Female proboscis normal, retracted, antennæ brown.....*inæqualis*, p. 464.

13. Mesopleuræ with one strong backwardly directed bristle, small bristles very indistinct or absent, anterior pair of scutellar bristles unusually reduced..14.
Mesopleura bare, the anterior pair of scutellar bristles always strong in female but sometimes much reduced in male.....15.

14. Two pairs of nearly equal post-antennal bristles, costal fringe of moderate length, hind and mid femora without strong bristle-like hairs on ventral surface. *macrochæta*, p. 464.
Only one very short pair of post-antennal bristles, fringe very long, hind and mid femora with 2–3 very long curved bristle-like hairs on apical third of ventral surface.....*spinifemorata*, p. 465.

15. Hind tibial cilia on basal two-thirds very strong and widely placed except at extreme base, ceasing abruptly at apical third to be replaced by 4–5 small hair-like setulæ, one very long terminal setula at apex, second abdominal segment with 4–5 very long and strong bristles on lateral margins in both sexes. *ruficornis*, p. 466.
Hind tibial setulæ not abruptly reduced on apical third, generally strongest on that part, lateral bristles on second segment more numerous but weaker.....16.

[1] Immature specimens are always paler in color, even in the black section.

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16. Costa to much beyond wing middle, fringe very short, abdomen orange-red, apically blackened, legs wholly yellow ..... *aurea*, p. 467.
Costa to slightly beyond middle, fringe longer, abdomen yellow, with lateral black spots or bands on segments, tips of hind femora blackened.
a, halteres yellow, thorax clear yellow ..... *scalaris*, p. 467.
b, halteres brown, thorax brownish yellow ..... *cordobensis*, p. 467.
17. Mesopleura with one strong backwardly directed bristle, or with numerous small bristles ..... 18.
Mesopleura bare ..... 19.
18. Mesopleura with numerous small bristles.
a. Arista thick and short, barely longer than frons ..... *sublutea*, p. 468.
b. Arista thin, distinctly pubescent, and at least one-third longer than frons ..... *carlynensis*, p. 468.
Mesopleura with one strong backwardly directed bristle ..... (see 14).
19. First division of costa not longer than the second and third together, the fringe short ..... 20.
First division of costa longer than the other two together ..... 21.
20. Frons gray-brown, lower pair of post-antennal bristles about one-half as long as upper pair, second abdominal segment weakly bristled laterally, first costal division shorter than second ..... *flava*, p. 469
Frons yellow, darker on vertex, lower post-antennal bristles about one-fourth as large as upper, second abdominal segment with several distinct bristles laterally, first costal division as long as second ..... *subflava*, p. 469.
21. Center pair of bristles in first row very much lower on frons than outer pair, and directly under them near the eye margins, so that it looks as if there were two rows of two bristles each, instead of one row of four on front of frons; post-antennal bristles of equal size ..... *atlantica*, p. 470.
Center pair of bristles in first row very slightly lower on frons than outer pair, and further from the eye-margins ..... 22.
22. Costa reaching to middle of wing ..... 23.
Costa short of the middle of the wing ..... 26.
23. First costal division very slightly longer than second and third together, the fringe of moderate length and widely placed, fourth dorsal abdominal segment of female with a lateral transverse incision, which appears to divide the segment, at slightly beyond basal third ..... *incisa*, p. 470.
First costal division distinctly longer than other two together ..... 24.
24. Frons, antennæ, and halteres yellow; costal fringe long, first costal division more than twice as long as second ..... *lutea*, p. 471.
Frons and antennæ brown or black ..... 25.
25. Small species, about 1 mm. in length, first costal division about one and one-half times the length of second; frons, antennæ, and halteres brown; fringe of moderate length but sparse and delicate; halteres brown ..... *obscura*, p. 471.
Larger species, about 1½ to 2 mm. in length, first costal division about twice as long as second, fringe extremely long and strong, halteres yellow. *evarthæ*, p. 472.
26. Frons black or brown ..... 27.
Frons and antennæ yellow, sometimes infuscated above on frons, and at tip of antennæ ..... *straminipes*, p. 474.
27. Antennæ yellow; hind tibiæ without distinct setulæ ..... *straminea*, p. 472.
Antennæ black or brown ..... 28.
28. Lower post-antennal bristles but slightly smaller than the upper, thorax reddish yellow, fifth segment of abdomen in female about one-third as long as fourth, seventh segment pale whitish yellow ..... *fungorum*, p. 473.
Lower post-antennal bristles about half as large as upper, generally less; fifth segment in female not shortened ..... 29.

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29. Hind tibial setulæ strong and distinct; wings long, the first costal division but little longer than second and third together ..... *longipennis*, p. 473.
Hind tibial setulæ small and indistinct; wings normal, costa rather shorter than in *longipennis*, and longer fringed, first division distinctly longer than second and third together (about as in *fungorum*) ..... *cayuga*, p. 474.
30. Scutellum with four subequal bristles ..... 31.
Scutellum with only two distinct bristles, sometimes two weak hairs present anterior to the ordinary bristles ..... 34.
31. Halteres black-brown ..... 32.
Halteres yellow ..... 33.
32. Scutellar bristles on margin of scutellum ..... *johannseni*, p. 474.
Scutellar bristles not on margin, the posterior pair nearly on center of disk. *brunnipes*, p. 475.
33. Scutellar bristles rather weaker, the anterior pair slightly smaller than the posterior pair; a distinct bristle on base of third longitudinal vein. *iroquoiana*, p. 476.
Scutellar bristles strong, the anterior pair at least as strong as the posterior. *ursina*, p. 476.
34. Female proboscis exerted, very prominent, sometimes chitinised ..... 35.
Female proboscis not exserted and chitinous, generally retracted and always fleshy ..... 37.
35. Mid and hind tibiæ with a single minute apical spur each ..... 36.
Mid tibial apical spur very long, hind tibial spur minute ..... *proboscidea*, p. 477.
36. Female proboscis very large and swollen, fleshy, bifurcate; costa to distinctly beyond wing middle ..... *rostrata*, p. 477.
Female proboscis stout and chitinous, costa to short of wing middle .. *cata*, p. 477.
37. Mesopleura bristly ..... 38.
Mesopleura bare ..... 51.
38. Halteres black ..... 45.
Halteres yellow ..... 39.
39. Mesopleura with one very strong backwardly directed bristles besides the numerous short bristles; costa to about middle of wing, fringe very short; fourth abdominal segment in female very short ..... *ciliata*, p. 481.
Mesopleural bristles of equal sizes, no one bristle noticeably longer than the others ..... 40.
40. Frons glossy black, as long as broad, costa to short of middle of wing, fringe short, small species, 1 mm ..... *retardata*, p. 482.
Frons dusted, generally broader than long; fringe of moderate length, larger species generally 1½ mm. or over ..... 41.
41. Extreme margin of wing tip dark-bordered, costa short of wing middle, first division shorter than other two together ..... *approximata*, p. 483.
Extreme margin of wing tip not dark-bordered, only sometimes the front margin of wing beyond costa a little thickened and darker, but never round apex of wing ..... 42.
42. Shining black species with brown legs, only the anterior pair paler, first costal division equal to other two together ..... *vulgata*, p. 483.
Brown-black species, legs yellow, sometimes the posterior pair darker ..... 43.
43. Small species, 1½–2 mm ..... *difficilis*, p. 484.
Larger species, over 3 mm ..... 44.
44. First costal division about as long as other two together, fringe very long. *anomala*, p. 484.
First costal division distinctly longer than other two together, fringe of moderate length ..... *subobscurata*, p. 485.

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45. Mesopleura with one bristle noticeably longer and stronger than the others.....46.
Mesopleural bristles of nearly equal lengths, no one bristle particularly long and strong.....47.
46. One very long, and strong, backwardly-directed bristle; male third antennal joint half as large as eye; costa to two-fifths of wing length.....*arizonensis*, p. 478.
One bristle noticeably longer than the others but not remarkably long nor strong, male third antennal joint of normal size; costa to about middle of wing.
monticola, p. 479.
47. Costa to near the middle of wing.....48.
Costa at most two-fifths of wing length.....49.
48. Small brownish species (1½ mm. at most); first costal division about one and one-half times as long as other two together, fringe long.....*franconiensis*, p. 479.
First costal division at least twice as long as other two together; species about 2½ mm. in size.....*dubitata*, p. 480.
49. Costa very short, about one-third the wing length, frons longer than broad, distinctly shining, fourth and fifth wing veins divergent from base to tip.
divergens, p. 480.
Costa to two-fifths the wing length; frons about as broad as long, gray dusted anteriorly, fourth and fifth wing veins parallel on basal half.....50.
50. First costal division about one and one-half times as long as other two together.
atomella, p. 481.
First costal division distinctly more than twice as long as other two together.
subatomella, p. 481.
51. Halteres black or brown.....52.
Halteres yellow.....58.
52. Costal fringe very short.....53.
Costal fringe long.....54.
53. Costa short of wing middle, first division distinctly longer than other two together; hind tibial setulæ indistinct, brownish black species.....*fungicola*, p. 485.
Costa to middle of wing, first division only as long as other two together; hind tibial setulæ distinct; black species.
a. Two pairs of post-antennal bristles present.....*furtiva*, p. 486.
b. Only one pair of post-antennal bristles present.....*bicolorata*, p. 486.
54. Costa to middle of wing.....55.
Costa short of middle of wing.....56.
55. Costa distinctly swollen, halteres brown.....*conspicualis*, p. 487.
Costa normal, halteres black.....*inornata*, p. 488.
56. Frons longer than broad, upper post-antennal bristles separated by more than one-third the breadth of frons, lower pair by about one-fourth; palpi yellow.
borealis, p. 488.
Frons broader than long, upper post-antennal bristles separated by about one-fourth the breadth of frons, lower pair but little closer; palpi black.....57.
57. Halteres brown, abdomen with short hairs, longer and quite prominent on ventral surface at near tip.....*rusticata*, p. 489.
Halteres deep black, abdomen nearly bare, the ventral surface near tip with only a few rather short hairs.....*perplexa*, p. 489.
58. Costa to distinctly beyond middle (see *smithii* Brues).....59.
Costa to middle, or short of it.....62.
59. Hind tibial setulæ distinct and not particularly numerous.....60.
Hind tibial setulæ hair-like and very numerous or indiscernible.....61.
60. Small glossy brownish species (1–1½ mm.); both pairs of post-antennal bristles present.....*chætoneura*, p. 490.
Larger black species (3½ mm.); only one distinct pair of post-antennal bristles.
infumata, p. 490.

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61. Antennæ brownish yellow, cave species ..... *cavernicola*, p. 491.
Antennæ black ..... *peregrina*, p. 492.
62. Hind tibiæ with distinct setulæ, which are not particularly numerous nor closely placed ..... 63.
Hind tibial setulæ indistinct, hair-like and very numerous in the species with long costa; if the setulæ are somewhat more distinct and sparse then the costa is very short ..... 65.
63. Two distinct post-antennal bristles, frons not longer than broad nor noticeably polished ..... 64.
Frons noticeably longer than broad, distinctly polished, four post-antennal bristles present; costal fringe very short, fourth vein nearly straight at base. *minor* male, p. 494.
64. Black species; costa to near middle, fourth vein distinctly bent at base, fringe long, thick veins black ..... *dyari*, p. 493.
Brown-black species; costa to two-fifths of wing length, fringe of moderate length, fourth vein nearly straight at base, thick veins flavous ..... *flavinervis*, p. 493.
65. Costa to middle of wing or near to it, always more than one-third the wing length ..... 66.
Costa to barely more than one-third the wing length ..... *pygmæa*, p. 499.
66. Four large and nearly equal post-antennal bristles ..... 67.
Lower pair of post-antennal bristles very much reduced in size or absent ..... 71.
67. Costa to middle of wing, fringe very long ..... 68.
Costa to short of wing middle, fringe very short ..... 70.
68. Abdomen in male with long scale-like hairs, female abdomen with scattered hairs, fourth vein bent at base ..... *rufipes*, p. 494.
Abdomen in male with only the ordinary hairs ..... 69.
69. First costal division not longer than second and third together .. *pulicaria*, p. 495.
First costal division distinctly, but not greatly longer than second and third together ..... *evarthæ*, p. 472.
70. Black species; frons longer than broad, highly polished; legs strong, fourth vein very slightly bent at base, costa to just short of wing middle, wings infuscated. *minor*, p. 494.
Brownish or yellowish species, costa distinctly short of middle, frons not highly polished ..... *setacea*, p. 495.
71. Hind tibiæ in male flattened on the apical third of dorsal surface ..... 72.
Hind tibiæ normal ..... 73.
72. Last abdominal segment to male with distinct long hairs; costa to short of or near to middle of wing ..... *albidohalteris*, p. 496.
Last abdominal segment in male without such long hairs, costa to beyond middle. *smithi*, p. 497.
73. Frons distinctly shining, longer than broad, lower pair of post-antennal bristles about half as large as upper pair, center pair of bristles in first row much lower on frons than outer pair ..... *fuscopedunculata*, p. 498.
Frons barely shining, broader than long, center pair of bristles in first row nearly in transverse line with outer pair ..... *agarici*, p. 499.

APHIOCHÆTA MARGINALIS, new species.

Female.—Black; frons dull black, four strong, nearly equal-sized post-antennal bristles, the lower pair much closer than the upper, antennæ brown, normal in size, palpi yellow, moderately bristled; thorax somewhat shining, scutellum with six bristles, the outer and center pairs weaker, mesopleuræ with one long and very strong bristle

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directed backward besides the numerous small ones, abdomen with the segments subequal, lateral bristles on second segment weak, segments 1–4 narrowly margined posteriorly with yellow, 5–6 entirely black, the latter with a few hairs; legs yellow, posterior femora and tibiæ dusky apically, mid and hind tibiæ setulose on the postero-dorsal surfaces, those on hind tibiæ distinct, wings grayish, costa to middle, first division more than twice as long as second, second twice as long as third, fringe moderately long, fourth vein leaving at fork of third with a gentle curve and running slightly upward to before the tip of wing, ending as much before wing tip as fifth does behind it, halteres brownish yellow.

Length, 2 mm.

Type.—Cat. No. 14844, U.S.N.M.

Two specimens; label, "2m. W. St. Louis, Mo., 9–VI–1904" (W. V. Warner).

The peculiar very long mesopleural bristle should distinguish this species, as well as the number of scutellar bristles. I am, however, not inclined to consider the latter, owing to their size, as the normal number in this species, as there may really only be four in some specimens. The only Paleartic species that I know of with this exceptional number of bristles on the scutellum is *flavicoxa* Zetterstedt, which has six equal-sized bristles, though one in Zetterstedt's collection has seven, as has also one in my collection in the Royal Scottish Museum, Edinburgh. In some much smaller species in *Aphiochæta* there is the remarkable lengthening of one of the mesopleural bristles, but except next species they are considerably smaller with only two scutellar bristles and other characters which easily separate them from the above. (See also *A. juli* Brues and next species after it in table.)

APHIOCHÆTA SUBMARGINALIS, new species.

Resembles in most respects the above species but the frons is as stated in table, the antennæ are rather smaller and the arista shorter than in *marginalis*. The long mesopleural bristle is also comparatively shorter, the palpi are not so bright in color, the legs, especially the hind pairs, are darker, the abdomen is entirely dark, the posterior pair of legs are very strong, and the hind tibial setulæ are short, though strong, and regular on the apical two-thirds but absent on the basal third. Otherwise as *marginalis*.[1]

Type.—Cat. No. 14845, U.S.N.M.

One female, Plummers Island, Maryland (A. K. Fisher).

[1] The scutellum is in poor condition so that I can not detect whether the additional bristles are present as in *marginalis*.

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APHIOCHÆTA JULI Brues.

Yellow; frons yellow, upper part brownish, or all brown, lower post-antennal bristles very small, not half the size of the upper pair, antennæ brownish-yellow, palpi yellow, normal; thorax dull yellow, four nearly equal scutellar bristles, mesopleuræ with a number of very short bristles and one long and very strong backwardly directed bristle, abdomen with the apex of first segment with a black band, the other segments dark brown except the narrow hind marginal bands which are yellow, several bristles on sides of second segment; legs yellow, the apices of hind femora darkened, hind tibial setulæ (7–8) very weak but long and widely placed; costa to middle of wing, first division as long as other two together, third division about one-third as long as second, fourth vein leaving at just beyond fork, slightly curved at base and ending before wing tip; halteres dusky.

Length, 2 mm.

Mr. H. S. Barber obtained a good series of females and one male at Plummers Island on May 12, 1912, which came to myriapods he had placed in a jar. The male differs only in having an entirely black abdomen.

Later the same observer succeeded in rearing a number of specimens from a myriapod and informs me that it is freely attracted to specimens of *Spirobolus marginatus* if they are placed in an exposed place on Plummers Island.

This is the species described as *xantippe*, Banks[1]. Brues describes his species as a *Plastophora* and at first I had difficulty in associating it with Banks' species.

APHIOCHÆTA PERDITA, new species.

Female.—Yellow; frons clear yellow, longer than in *xantippe* Banks, the anterior pair of post-antennal bristles are about half as large as the posterior or upper pair, the center pair of bristles are also much lower on frons than in *xantippe*, the anterior pair of scutellar bristles are only half as large as the posterior pair, the small mesopleural bristles are more distinct, the large one being smaller than in *xantippe* and situated much lower on the mesopleuræ, the abdomen is yellow with the apex of first, the whole of second, and most of third segments, as well as extreme tip of abdomen black, the second segment is much elongated, and dilated laterally on basal half with two to three bristle-like hairs on the dilated portions; the legs are colored as in the previous species, but the hind tibial setulæ are much more distinct, closer placed, and more numerous (12–13) than in *xantippe;* halteres yellow.

Length, 2½ mm.

[1] Trans. Wash. Ent. Soc., 1911, p. 212.

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One female, Plummers Island, Maryland, 27–6–09 (W. L. McAtee); one female, Holly Springs, Mississippi (F. W. Mally). The enlarged bristle on mesopleura separates it from the next species, and the points enumerated in description from *xantippe* Banks, which is most closely allied to it.

Type.—Cat. No. 14846, U.S.N.M.

APHIOCHÆTA ARCUATA, new species.

Female.—Black, distinctly shining; frons shining, slightly gray pollinose, longer than broad, upper post-antennal bristles small and very close together, occupying about one-seventh the breadth of frons, lower pair minute, center pair of bristles in first row slightly lower on frons than upper post-antennals and midway between them and outer pair in first row which are very slightly higher on frons, center pair in second row about one-fifth the distance from ocellar triangle to post-antennal bristles, antennæ very small, brown, arista very short, barely two-thirds as long as frons, bare, palpi dusky yellow, of moderate size, weakly but numerously bristled; disk of thorax very thickly covered with minute hairs, mesopleuræ with numerous bristles, two or three of which on the lower posterior margin are distinctly longer than the others, scutellum with four bristles, the anterior pair weaker than the posterior; abdomen broad and rather short, egg-shaped, broadest at apex of second segment, second and third segments with several short lateral hairs, the others almost bare; legs piceous, fore coxæ and all tibiæ paler, hind femora with rather long hairs on ventral surface, mid tibiæ without setulæ, hind tibiæ very strong, the dorsal ridge very distinct causing the dorsal surface to present an arcuate appearance when viewed laterally, setulæ distinct; wings distinctly infuscated, costa to middle, first division distinctly, but not greatly, longer than other two together, third one-third as long as second, fringe nearly as long as fork of third vein, very delicate, fork of third vein acute, fourth vein very slightly bent at base and regularly arcuate, ending distinctly in front of wing tip; halteres yellow.

Length 2 mm.

One female, Cabin John Bridge, Maryland, April 28, 1912 (Knab and Malloch).

Type.—Cat. No. 14847, U.S.N.M.

APHIOCHÆTA NIGRICEPS Loew.

Yellow; frons dull black, four post-antennal bristles, the lower pair half the size of the upper, antennæ black-brown, of moderate size, arista pubescent, palpi yellow, large, distinctly bristled, thorax yellow, indistinctly striated, scutellum with four almost equal-sized bristles, mesopleuræ with a number of small bristles on upper posterior angle; abdomen with only the base of the first segment and the apices of the

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third and fourth narrowly yellow, fifth and sixth brownish, second segment elongate and dilated laterally, with several bristles on lateral angles, ovipositor retracted, yellow; pleuræ with a black spot behind wing base, mid coxæ with a black spot anteriorly and posteriorly; legs yellow, apices of hind femora dusky, mid and hind tibiæ distinctly setulose on their postero-dorsal surfaces, 6 to 7 on basal half of mid and 11 to 12 on hind tibiæ from base to tip; wings with costa to slightly beyond middle, first division equal to other two together, third division about one-third the length of second, fringe long, the bristles longer than fork of third vein, fourth vein curved at origin rather beyond fork of third and running almost straight to near the wing tip, seventh vein distinct, halteres clear yellow.

Length, 3½–4 mm.

There were quite a number of specimens standing as this species in the collection, but all that I can find to agree with the description are five from Mount Washington, four of which did duty as *scalaris* Loew and one of which is labeled "Phora nigriceps, Lw." There is another specimen from Mount Katahdin, Maine, summit 5,215 feet, August, 1902. No collector's name. I have also seen it from Massachusetts and Rhode Island (Johnson). On the testimony of Coquillett, Brues accepted *aletiæ* Comstock as a synonym of this species in his paper already quoted, but there is a good distinction between these species, and the series in the collection that stood as *nigriceps* was principally *aletiæ* Comstock.

APHIOCHÆTA WINNEMANA, new species.

Female.—Yellow; frons black, anterior post-antennal bristles extremely small, antennæ yellow, arista dark, short, not longer than frons, thick, indistinctly pubescent; dorsum of thorax dark reddish yellow, paler at sides, pleuræ and coxæ immaculate, anterior pair of scutellar bristles about one-half the size of posterior pair; abdomen yellow, second segment but little longer than third, lateral bristles present, segments 2–4 broadly banded with black posteriorly, sixth centrally and apically yellow, ovipositor extruded, blackish brown; legs yellow, apices of hind femora broadly brown, mid tibiæ without distinct setulæ, those on apical three-fifths of hind tibiæ (7–8) large and distinct; wings much as in *nigriceps*, but the fringe is comparatively longer and the costa reaches distinctly beyond the middle of the wing; halteres yellow.

Length, 2 mm.

Very similar to *nigriceps* Loew, but the points mentioned in the description should serve to distinguish them.

One female, Plummers Island, Maryland (H. S. Barber).

Type.—Cat. No. 14848, U.S.N.M.

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APHIOCHÆTA ALETIÆ Comstock.

Yellow; frons black-brown, paler in front, with yellowish rather thick pubescence anteriorly and centrally, lower post-antennal bristles not half as large as upper pair; antennæ brown, arista with distinct pale pubescence; palpi yellow; thorax yellow, sometimes reddish tinted, scutellum with two strong bristles and two pale hair-like bristles anterior to them, less distinct in the male; abdomen with the dorsum sometimes entirely brown except the narrow hind-marginal yellow bands, and sometimes with lateral spots carried across in a more or less narrow band posteriorly, varying in intensity from reddish brown to black; legs yellow, apices of hind femora brownish, basal half of hind femora with a series of curved hairs, hind tibial setulæ very fine, only those on apical half strong; wings clear, neuration as in table but the male generally has the first section comparatively longer and the second and third more nearly equal in length than the female; halteres yellow.

Length, 1–2 mm.

This species was originally described by Comstock in the Report on Cotton Insects, 1879. It was then considered as a parasite on *Aletia argillacea* (the cotton worm), but this has since been proven a mistake. As already stated, Brues gave *aletiæ* as a synonym for *nigriceps* in his monograph on the Phoridae, but an examination of a number of Comstock's original specimens still in the Museum has shown that it is not that species, and the figure given with the original description, while not what one might desire, is sufficiently clear to show that it is a distinct species from that figured by Brues. The original specimens are labeled August 27, 1879, and stood in the collection labeled by Coquillett *nigriceps* Loew. I have no other course than to reinstate this species as it is already shown distinct from *nigriceps*, being in fact much nearer to *fungicola* Coquillett than to any other species and possibly this is the species referred to by Brues as *fungicola* var. with pale halteres. Reared from *aletia* pupæ (Comstock). I have also seen a specimen reared from garbage by Professor Johannsen (Ithaca, New York.)

APHIOCHÆTA CONICA, new species.

Plate 36, figs. 5, 6, 11.

Female.—Yellow; frons brownish toward vertex, ocellar triangle broad but very short, frontal suture distinct, bristles moderately strong, only two post-antennal bristles, central pair of bristles in front row very wide apart and placed low down at near the lateral angles of frons, nearly in line with post-antennal pair, and but little farther from eye margin than outer bristles above them, the second row of bristles almost equidistant from each other and nearly in a straight line, antennæ yellowish, third joint nearly round, arista

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rather thick, palpi large, moderately bristled, proboscis yellow, long, projecting, rather tapering and chitinised; two dorsocentral thoracic bristles; scutellum with two strong bristles and two anterior hairs, mesopleuræ bare; abdomen with first and sixth segments mostly yellow, the others black, second segment laterally dilated, several bristles on lateral margins, third segment with a regular row of strong hind-marginal and several lateral bristles, sixth segment elongated, with several long bristles at apical third; ovipositor exserted, chitinised, of nearly equal width for its entire length, about two and one-half times as long as broad, truncate apically; legs yellowish, hind pair darker, hind tibiæ with setulæ on postero-dorsal surface, those on apical half very distinct; costa to middle of wing, first division one and one-half times as long as second, fork of third vein acute, costal fringe of moderate length, as long as fork of third vein, fourth vein leaving at fork of third with a gradual bend and running with a sweep to near tip of wing, fourth, fifth, and sixth veins at nearly equal distances from each other in disk of wing; halteres pale yellow.

Length, 2 mm.

One female. "Bred from abdomen of *Camponotus pennsylvanicus*," August 22, 1901 (T. Pergande), Washington, District of Columbia.

The chitinised ovipositor may be for the same purpose as that of *Apocephalus pergandei* Coquillett, and the fact that this specimen was bred from the same host would seem to bear this out.

Type.—Cat. No. 14850, U.S.N.M.

APHIOCHÆTA FISHERI, new species.

Female.—Yellow; frons black, yellowish above the antennae, lower pair of post-antennal bristles rather more than half the size of upper pair, which are strong; antennæ yellow, brownish at tip, arista longer than frons, pubescent, palpi yellow, with normal bristles; proboscis large and fleshy, protruding; thorax clear yellow, anterior pair of scutellar bristles reduced slightly in size, abdomen with either the hind margins of segments narrowly yellow, or the lateral margins broadly black carried across on the anterior margins in a narrow band, second segment not elongated, but with some inconspicuous bristles laterally; legs yellow, hind femora with apices infuscated, mid tibial setulæ indistinct, those on apical half of hind tibia (8–9) large and distinct, wings grayish, veins brown, neuration as in table, halteres yellow.

Length, 2½–3 mm.

Type.—Cat. No. 14851, U.S.N.M.

Two females, Plummers Island, Maryland, May 16, 1907 (A. K. Fisher); May 30, 1907 (W. L. McAtee).

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Easily separated from its allies by the large fleshy proboscis of the female, but the male may not be so easily recognized, as that organ is very probably of normal size and retracted in that sex. Like the next species the male will very probably have the scutellar bristles more unequal. A female from Delaware Water Gap, New Jersey (C. W. Johnson), has the proboscis less prominent, but agrees in other respects with those from Plummers Island. One female, Hyattsville, Maryland, September 1, 1912 (Malloch and Knab).

APHIOCHÆTA INÆQUALIS, new species.

Male and female.—Yellow; frons black, gray dusted, lower post-antennal bristles in male nearly as large as upper pair, in female much smaller; antennæ brown, arista yellow at base, almost bare, palpi yellow, normal; thorax yellow, darker in male, anterior scutellar bristles very small and weak in male, but about three-fourths as large as the posterior pair in female, abdomen black, with narrow, yellow hind-marginal bands, that on sixth segment more distinct in female, first, fifth, and sixth segments nearly all yellow, merely laterally infuscated in male, second segment very slightly elongated and with several lateral, weak, but distinct bristles, male hypopygium large, yellowish brown, the anal protuberance long and yellow, with 2 very slender long terminal hairs, female ovipositor yellow; wings grayish, veins brown, costa to middle of wing, first division about twice as long as second, third vein thicker than costal vein, fringe long and thick; legs yellow, hind femora dusky at apices and with a series of longish, black, curled hairs on basal half of ventral surface, hind tibiæ darkened at apex posteriorly, setulæ on basal half weak, but the 5–6 on apical half strong and nearly equal in size; halteres yellow.

Length, 2–3 mm.

A pair from Ithaca, New York (O. A. Johannsen), and one female from Fieldbrook, California, May 29, 1904 (H. S. Barber), that evidently belongs to the same species. I have also seen three females from Hanover, New Hampshire (Johnson).

Type-locality.—Ithaca.

Except that the lower post-antennal bristles are very small, almost imperceptible, I can see no difference that would cause me to separate the Californian specimen from the type.

Type.—Cat. No. 14852, U.S.N.M.

APHIOCHÆTA MACROCHÆTA, new species.

Female.—Yellow; frons yellow, bristles strong, post-antennal bristles of nearly equal size, strong, upper pair widely placed; antennæ yellow, arista distinctly pubescent, longer than frons, palpi yellow, strongly bristled; thorax yellow, anterior pair of scutellar bristles very weak, hardly more than weak hairs; mesopleuræ with one strong,

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backwardly directed bristle, but in the specimen before me I can not detect the usual short bristles, abdomen yellow, first segment with the disk, second segment with lateral and posterior margins narrowly, and remaining segments entirely darkened, venter yellow, second dorsal segment with 2 to 3 bristle-like hairs; legs entirely yellow, mid tibial setulæ distinct, hind tibial setulæ (9–10) large and distinct, the terminal one at apex especially so; costa to middle of wing, first division rather longer than second, but not longer than second and third together, third about one-fourth as long as second, fringe about three times as long as diameter of costa, fourth vein leaving at fork of third, very slightly curved at origin and running nearly straight to in front of wing tip; knob of halteres yellow, pedicel darkened.

Length, 2 mm.

A species that may fall easily into that section with only two scutellar bristles, and very probably the male has only two. It is quite distinct from any of the other species that I have seen either here or in Europe.

Locality.—Arroyo, Porto Rico, February, 1899 (A. Busck), one female.

Type.—Cat. No. 14853, U.S.N.M.

APHIOCHÆTA SPINIFEMORATA, new species.

Plate 36, fig. 4.

Female.—Yellow; frons yellow, about one-half broader than long, only the ocelli black, one pair of very long and strong post-antennal bristles, rather widely placed, divergent, first row of frontal bristles very low down and forming a convex line with the post-antennal pair, the space between them being much less than that between the center one and the post-antennal, second row nearly straight, midway between the ocelli and the post-antennal bristles, antennæ rather large, yellow, slightly darkened at insertions of arista, arista distinctly thickened on basal joints, the apical portion very thin and nearly bare, palpi yellow, of good size, and strongly bristled; the two bristles below the eye very prominent; thorax darker than frons, with the usual bristles, mesopleuræ with one very strong backwardly directed bristle, the usual small bristles absent, scutellum with two weak hair-like bristles in addition to the two large marginal bristles posterior to them, abdomen broad, more or less suffused with black-brown laterally and posteriorly, except the sixth segment, and the usual narrow hind-marginal bands which are yellow, second segment slightly elongate, sixth elongate and rather conical, all segments with 2 to 3 strong lateral, marginal bristles, ovipositor exserted, somewhat similar in size and shape to that of *conica*, not chitinous; legs yellow, the apices of hind femora darkened, bristles on coxæ and legs strong, hind and mid femora with row of bristles on ventral surfaces, three or

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four on apical third very strong, curved, and widely placed; hind tibiæ with numerous strong hairs, those on antero-dorsal surface strong, but not so markedly different from the others that it could be placed in Group B, the postero-dorsal bristles (9–10) large and row complete; wings yellowish, costa to fully wing middle, first division equal to second, third about one-fourth the length of second, costal fringe very long and strong, its bristles equal in length to width of basal costal cell; halteres dusky yellow.

Length, 1½ mm.

One female Mandrilla, Jamaica (T. D. A. Cockerell).

Standing in collection as "*Phora scalaris*, Lw."

Type.—Cat. No. 14854, U.S.N.M.

APHIOCHÆTA RUFICORNIS, Meigen.

Yellow; frons in female clear yellow, in male browned above, lower post-antennal bristles less than half the size of the upper pair; third joint of antennæ in male large and oval, in female smaller, and not so much darkened at tip, arista distinctly pubescent, palpi yellow, normal; thorax slightly darkened posteriorly; four equal sized scutellar bristles; abdomen yellow, first segment with a narrow, preapical, black band, the others with broad, lateral spots which suffuse nearly the entire segments 2–4, segments 5–6 yellow on disk, second segment slightly elongate and dilated in male and in both sexes with 4 to 5 very long hair-like bristles laterally; legs yellow, hind femora blackened at tips, and ciliated with hairs on the apical third of their ventral surfaces; bristles on mid tibiæ weak, those on hind tibiæ weak at base but rapidly increasing in size to beyond middle then abruptly ceasing, very long and widely placed, the apical third occupied by 4 to 5 very small setulæ and one long bristle at apex; wings yellowish, veins brown, costa to beyond middle, first division shorter than second, first vein joining the costa at an obtuse angle, third division about one-fourth the length of second, halteres yellow.

Length, 3½ mm.

There are two specimens (male and female) from Franconia, New Hampshire (Mrs. Slosson), and one male from Plummers Island, Maryland (A. K. Fisher), which I am unable to separate from the European species except by color. In this group color is an unsatisfactory character to base a specific distinction upon and I prefer to consider this species as identical with that of the European fauna, which in Britain varies from yellowish to black, and would probably be much more prone to vary to the lighter forms in this country. I have also seen one female of this species from Ithaca, New York (O. A. Johannsen), and one female from Delaware Water Gap, New Jersey, July 12. (This last is in the collection, but there is no collector's name on it.)

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APHIOCHÆTA AUREA Aldrich.

Yellow; frons, antennæ and palpi yellow, scutellum with four marginal bristles, abdomen bright orange red, the apex more or less blackened, legs entirely yellow, hind femora with a few bristles near the tip, hind tibiæ with 10 to 11 setulæ; costa to much beyond wing middle, first division of costa about as long as second, costal bristles very short, not much longer than diameter of costal vein, halteres sometimes darkened.

Length, 1.3–1.7 mm.

Type specimens from Grenada, West Indies, in collection.

APHIOCHÆTA SCALARIS Loew.

Yellow; frons clear yellow in female, darkened on upper portion in male, lower post-antennal bristles about one-half the size of upper pair in male, more nearly equal in female; antennæ yellow, arista pubescent, thorax rather dark in male, clear yellow in female; four nearly equal scutellar bristles in female, in male the anterior pair much reduced in size; abdomen yellow in both sexes, with a narrow, black, subapical band on first segment, large lateral spots carried across in more or less narrow bands posteriorly on all the segments, second segment slightly elongate, and dilated laterally, with several bristles on lateral angles, not so strong as, and more numerous than in *ruficornis* Meigen; legs yellow, the apices of hind femora black, ventral surface of hind femora with some distinct hairs; mid tibiæ with double row of bristles, the antero-dorsal row weak, hind tibiæ with continuous series of moderately strong bristles (8–9 in male, 10–11 in female); costa to a little beyond middle of wing, first division rather shorter than second in male, about same length in female, third about one-fifth as long as second, fringe short and close; halteres yellow.

Length, 2–3½ mm.

Three specimens "From onions, Tobago, W. I., June 4th, 1903;" from decaying insects, Pernambuco, Brazil, February, 1883 (six specimens); four specimens, "Host, *Hyphantria cunea*, November 8, 1895" (diary date which refers to specimens of *Phora venusta* Coquillett). Date on specimens which bear same diary number October, 19–28, 1895. One specimen Orlando, Florida (Chittenden); and eight specimens from Baracoa, Cuba (A. Busck). This specific name seems to have been like *nigriceps* the general repository of all unidentifiable yellow *Phoridæ*.

APHIOCHÆTA SCALARIS var. CORDOBENSIS, new variety.

Plate 36, fig. 9.

In most particulars as the above, but a more robust insect with a darker color over all; the wing neuration is as figured and the legs are rather stouter, while the halteres are brown instead of yellow. It

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is possible that this may be a distinct species, but there is only a single specimen in the collection from Cordoba, Mexico (F. Knab), and I am averse to describing it as a new species owing to the fact that *scalaris* has a very wide range, and shows considerable variation in size, and intensity of coloring though not to the extent shown in this specimen.

Type.—Cat. No. 14855, U.S.N.M.

APHIOCHÆTA SUBLUTEA, new species.

Female.—Pale yellow; ocellar triangle and upper part of frons brownish, upper pair of post-antennal bristles slightly stronger than lower, separated by about one-half the breadth of frons, lower pair by about one-fourth, center pair of bristles in first row directly below the outer pair and a little below the transverse line of upper pair of post-antennals, antennæ yellow, arista yellow at base, basal joints thick, apical portion dark, pubescent, rather longer than frons, palpi yellow, normal; thorax clear yellow, only two distinct scutellar bristles and anteriorly two microscopic hairs, mesopleuræ with numerous short bristles one of which is slightly longer than the others, but not remarkably so, abdomen yellow, segments subequal, each segment, except sixth, with a narrow preapical black band, dilated anteriorly laterally, bristles on second segment indistinct; legs yellow, apices of hind femora dusky, setulæ on hind tibiæ (11–12) in a regular row of moderate strength; first division of costa more than twice as long as second, third division about one-third as long as second, fringe long, fourth vein nearly straight at base, ending much in front of wing tip, halteres yellow.

Length, 2½ mm.

Two females, Franconia, New Hampshire (Mrs. Slosson). (Collection of Coquillett.)

Type.—Cat. No. 14856, U.S.N.M.

Labeled "*Phora scalaris* Loew," from which it is very easily distinguished by the costal divisions, the absence of the anterior scutellar bristles, which must be entirely absent in male if the general rule holds, and the long costal fringe, besides several other characters mentioned in the description. I have seen a male from Shark River, New Jersey, which is similar to the female, only differing in having the frons, antennæ, and abdomen brownish, and in being smaller.

APHIOCHÆTA CARLYNENSIS, new species.

This species comes close to *sublutea*, from which it differs as follows:

The frons is almost entirely brown, the lower pair of postantennal bristles are almost as strong as the upper pair, the latter occupying one-half the breadth of frons and the former about one-third; in *sublutea* the outer bristle in first row is nearer to the center bristle in same row, which is almost under it, than to the outer one in second

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row; in *carlynensis* they are almost equidistant; the arista in *sublutea* is thick, very shortly pubescent, and barely longer than frons, while in the new species it is thin, distinctly pubescent, and at least one-third longer than frons; the palpi are also darker, much more strongly bristled, and there are about six regular, strong bristles on the side of the face in *carlynensis*. Besides these points the mesopleural bristles are regular and only about 8 in number; there is a distinct black mark on the pleuræ below wing base and another behind on mid coxæ, the abdomen is, except narrow fore and hind marginal bands on segments 2–4, all brown-black; the hind tibial setulæ are strong and on apical third widely placed; the first costal division of wing is equal to the next two, the third about one-half as long as second; the costal fringe is about twice as long as diameter of costal vein; the fork of third vein is not so acute as in *sublutea*, and the fourth vein leaves at distinctly beyond fork.

Length, 2 m. m.

Type.—Cat. No. 15241, U.S.N.M.

Locality: Glen Carlyn, Virginia, August 12, 1912 (F. Knab). One female. One male, Rosslyn, Virginia, September 22, 1912, Malloch and Knab.

APHIOCHÆTA FLAVA Fallen.

Yellow; frons gray dusted, black or brown, lower pair of post-antennal bristles small, antennæ yellow, palpi yellow; thorax dark reddish yellow, narrow, only two scutellar bristles; abdomen narrow, segments subequal, the bristles on second abdominal segment very inconspicuous, hypopygium of male projecting, the anal protuberance rather small and dusky yellow, dorsum of abdomen nearly all brown-black, but indistinctly paler on first segment and base of second, costa to at least the middle of wing, first section shorter than second, costal cells narrow, fringe short; legs slim, the hind tibiæ not much thickened, the setulæ small and numerous (15–16) and very crowded on basal fourth; halteres yellow.

Length, 1½–2 mm.

There is one specimen in the collection from the District of Columbia.

APHIOCHÆTA SUBFLAVA, new species.

Male and female.—Yellow; frons yellow, posteriorly darkened in both sexes, lower post-antennal bristles about one-fourth the size of the upper pair, antennæ yellow; thorax yellow, two microscopic hairs anterior to the two strong bristles, abdomen broader than in *lutea*, and not so long in male comparatively, segments 2–4 with lateral black triangular marks, fifth yellow, sixth black, several distinct bristles on lateral margins of second segment, hypopygium of good size, protruding as in *flava*, but the anal protuberance is much more conspicuous, of a paler color, and has two strong hairs at the extremity

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the hind tibiæ are stronger than in *flava*, and the setulæ (8–10) are weaker and much more widely placed; the third vein is much further from the costa at its base than in *flava* and the costal cells are thus much wider than in that species; halteres dusky yellowish-brown (in one specimen yellowish).

Length, 1½ mm.

Two males and one female, Bayamon, Porto Rico (A. Busck).

Closer in general characters to *scalaris* Loew, but the very small anterior scutellar hairs separates it at once in both sexes from that species.

Type.—Cat. No. 14857, U.S.N.M.

APHIOCHÆTA ATLANTICA Brues.

Yellow except tips of hind femora and anterior lateral corners of abdominal segments; frons honey yellow, thickly covered with fine black hairs, ocellar tubercle and median furrow present, four post-antennal bristles of nearly equal size and placed in a curve, the center pair of bristles directly underneath the outer pair of front row and much below them; antennæ yellow, arista pubescent; palpi very small; thorax somewhat shining, with black pubescence; two scutellar bristles; second to fifth abdominal segments with lateral spots, sixth black; bristles on second segment weak, hind tibiæ distinctly ciliated with setulæ on postero-dorsal surface; costa extending to middle of wing, with closely placed, very short bristles, first vein ending a little nearer the tip of third than to the cross vein.

Length, 1.75–2.5 mm.

One specimen "from rotten *Aletia*, Sept. 25th '80," seems to belong to this species. The arrangement of the frontal bristles is as given by Brues, but the color is rather different, and there are two anterior hairs on scutellum as well as the two bristles. I have not seen Brues's species, and the description is not clear enough on certain points to enable one to separate it from any closely allied forms. In any case if the above specimen is not *atlantica* it must belong to an undescribed species, and I prefer to leave it this way rather than to describe it as new when it may really belong here.

APHIOCHÆTA INCISA, new species.

Female.—Yellow; frons dull black, about as long as broad, lower post-antennal bristles very small, antennæ black, arista black, longer than frons, distinctly pubescent, palpi yellow, normal; thorax reddish yellow, scutellum with two bristles, abdomen brown, apices of all segment and base of second segment laterally yellow, several short bristles on lateral margins of second segment, a transverse incision from either side, not meeting in center, at about one-third from base of fourth segment makes it appear as if the fourth segment is very short (as in *ciliata* Meigen); legs dusky yellow, hind femora

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dilated, hind tibiæ strong, setulæ indistinct at base and apex, those (8–9) on central portion more distinct; costa to middle of wing, first division about one and one-fourth as long as second, third nearly one-fourth as long as second, so that the first division is barely longer than 2 and 3 together, fringe of moderate length, very delicate and widely placed, fourth vein curved at base, running nearly parallel with fifth for two-thirds of its length, ending much in front of wing tip with an upward curve; halteres brown.

Length, 1½ mm.

One female, Minatitlan, Mexico, February 1, 1892 (H. Osborn).

Type.—Cat. No. 14858, U.S.N.M.

APHIOCHÆTA LUTEA Melgen.

Yellow; frons sometimes darkened above, the antennæ always yellow, palpi normal; thorax pale yellow, scutellum with two bristles; abdomen more or less brown or black on dorsal segments, the anal protuberance rather short and broad, legs yellow, the apices of hind femora darkened, hind tibial setulæ delicate and regular; costa to middle of wing, second division less than half the length of first, fringe long and strong, fourth vein leaving at fork of third; halteres yellow.

Length, 1½–2 mm.

There are several specimens in the collection that belong to this species. One from Wisconsin is labeled as such by Brues, and there are three from Delaware Water Gap, New Jersey, July 12 (no collector's name or year), while a specimen from Eureka, California (H. S. Barber), is, though larger and slightly different in some minor characters, I believe, the same species. I have also seen it from Ithaca, New York (O. A. Johannsen).

APHIOCHÆTA OBSCURA Brues.

Yellow; frons brown, the lower post-antennal bristles about one-half the size of the upper pair; antennæ brown, arista long, pubescent, brown; thorax yellow, with a brownish tinge, pleuræ yellow, scutellum with two bristles; abdomen brownish black; legs yellow, hind tibial setulæ very small and indistinct; wings grayish, costa to middle, first division about one and one-half times as long as second, fringe of only moderate length and not strong, rather widely placed, fifth and sixth veins very distinctly convergent at middle, halteres brown.

Length, 1 mm.

I have only seen the type specimen in the museum.

Locality, St. Vincent, West Indies.

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APHIOCHÆTA EVARTHÆ, new species.

Male and female.—Yellow; frons black, bristles strong, the lower post-antennal pair nearly as large as the strong upper pair, antennæ black-brown, arista paler, long and indistinctly pubescent; palpi yellow, moderate in size, but with six to seven very long bristles; thorax yellow with a brownish tinge, two scutellar bristles; abdomen brown in female with paler hind margins; in male, black-brown, with very indistinct paler hind margins to segments; segments subequal, anal protuberance small, yellow; legs yellow, hind femora slightly dusky at apices; hind tibiæ very delicately setulose; wings yellowish; costa to middle, first division rather more than one and one-half times as long as second, fringe very long and strong, fourth vein leaving third at beyond fork, nearly straight, and ending distinctly in front of wing tip; halteres whitish yellow.

Length, 1½–2 mm.

Type.—Cat. No. 14859, U.S.N.M.

Four specimens labeled "Bred from *Evarthus ovatus*" (*Coleoptera*) June 28, 1897. No locality label. There are also seven specimens labeled "Bred from a dead *Polyphylla*" Detroit, August. These latter are darker in color of thorax and pleuræ, but quite evidently are the same species. The very long costal bristles and pale halteres distinguish this species readily, though in some cases the costa looks as if it hardly reached the wing middle, and sometimes the thorax is brownish, though the insect is readily recognized as a yellow species by its pale pleuræ and the very pale legs and coxæ. (See in section with bare mesopleura under "thorax black or brown.")

APHIOCHÆTA STRAMINEA, new species.

Male and female.—Yellow; frons black or brown, upper pair of post-antennal bristles large, lower pair about one-fourth as large as upper, antennæ small, spherical, clear yellow, arista brown, about one and one-half times as long as length of frons, pubescent; palpi yellow, normal; thorax yellow, pleuræ paler in color, scutellum with two bristles; abdomen yellow, more or less suffused with brown; several small bristles on lateral margins of second segment; legs and coxæ very pale yellow; several long curled hairs on basal half of ventral surface of hind femora. Sometimes the apex of hind femora is dusky; hind tibial setulæ very small and indistinct, only visible under a high power; costa to short of middle of wing in male, to middle in female, first division about twice as long as second, third about one-half as long as second, fourth vein leaving third at beyond fork, with a gradual bend, and ending recurved at much in front of wing tip; halteres yellow.

Length, 1–1½ mm.

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Type.—Cat. No. 14860, U.S.N.M.

The type series of this insect is from Ithaca, New York (O. A. Johannsen).

There are also several specimens that agree with them in every particular, except that the antennæ are rather dusky, in the collection belonging to the Bureau of Entomology, which were reared from fungi (Popenoe).

APHIOCHÆTA FUNGORUM, new species.

Plate 37, fig. 4.

Female.—Yellow; frons black, gray dusted, thickly covered with short hairs, lower post-antennal bristles nearly as large as the upper pair; antennæ black-brown, arista concolorous, distinctly pubescent; thorax reddish-yellow, pleuræ brownish, coxæ very pale yellow; abdomen brownish, first segment short, segments 2–4 subequal, fifth very short, about one-third as long as fourth, seventh pale yellowish, as long as fifth; legs yellow, hind femora and hind tibiæ darkened at apices, hind tibial setulæ very small and indistinct, hair-like; costa short of wing middle, first division longer than the other two together; fringe fine and close and of moderate length; halteres yellow.

Length, 1½ mm.

Type.—Cat. No. 14861, U.S.N.M.

Two females, Cabin John Bridge, Maryland (Popenoe).

The very short fifth abdominal segment should distinguish this species from those in the same section, in the female at least. It is quite probable that no such disparity exists in the male, in which case other characters will have to be used for distinguishing this sex.

APHIOCHÆTA LONGIPENNIS, new species.

Plate 37, fig. 3.

Female.—Yellow; frons black-brown, paler in front; lower post-antennal bristles delicate, less than one-half the size of the strong upper pair; antennæ brown, paler at base of third joint, arista brown, pubescent, palpi very pale yellow, normal in size and bristling; thorax deep yellow; abdomen yellow, suffused with brown except at base of segments, second segment with a few scattered hairs on lateral margins; segments 2–6 subequal; legs yellow, apices of hind femora darkened, hind tibial setulæ strong and distinct (12–13); wings rather long and narrow, the first costal division but little longer than the other two together; fringe long; halteres yellow.

Length, 1½ mm.

Type.—Cat. No. 14862, U.S.N.M.

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Two females, Opelousas, Louisiana, March, 1897. No collector's name or data other than given here. A male from same locality sent by C. W. Johnson has the costa rather longer and the third division about one-fourth as long as second, instead of one-half, as in the female. It has lost the head, so that I can not be certain that it belongs here.

APHIOCHÆTA CAYUGA, new species.

Yellow; frons brown, lower post-antennal bristles very minute; antennæ brown, arista brown, rather short, pubescent, palpi yellow, normal; thorax reddish yellow, abdomen brown, segments subequal except second in male, which is slightly elongated and dilated laterally, with a few bristles on the lateral margins; anal protuberance of male pale yellow; legs yellow, hind femora entirely yellow, hind tibial setulæ very small and indistinct; neuration nearly as in *fungorum;* fringe rather longer; halteres yellow.

Length, 1–1½ mm.

A large number of specimens from Ithaca, New York (O. A. Johannsen). Mr. H. S. Barber has bred this from a fungus *Lepiota procera* at Plummers Island, Maryland, September 10, 1912.

Type.—Cat. No. 14863, U.S.N.M.

APHIOCHÆTA STRAMINIPES, new species.

Yellow; frons yellow, slightly darkened towards the vertex, lower post-antennal bristles more than half as large as upper; antennæ yellow, arista brownish, long, and pubescent, palpi pale yellow, rather strongly bristled; thorax pale yellow, abdomen more or less suffused with brown, more distinctly on segments 2–4 laterally in male, segments subequal, bristles on second segment very indistinct, legs pale yellow, hind tibial setulæ very small and indistinct; costa distinctly short of wing middle, lengths of costal divisions much as in *longipennis,* but the first vein joining the costa at a much less acute angle, and fringe shorter; halteres dusky yellow.

Length, 1–1½ mm.

A number of specimens from Ithaca, New York. (O. A. Johannsen).

Type.—Cat. No. 14864, U.S.N.M.

APHIOCHÆTA JOHANNSENI, new species.

Female.—Dull black; frons distinctly gray dusted, lower pair of post-antennal bristles about three-fourths as large as the upper pair and not much closer together, neither pair divergent, central pair in first row much lower than the upper post-antennal bristles and as near to them as to the outer pair in first row; antennæ rather large, velvety black, arista not very long, indistinctly pubescent;

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palpi brown, with five to six moderately strong bristles; posterior edge of thorax with several bristles in addition to the usual dorso-central pair, scutellum with four equally strong marginal bristles; abdomen entirely black, second segment elongated slightly, and dilated laterally, eight to nine bristles of moderate length on lateral margins, apical segment with a few strong pre-apical hairs, ovipositor brown; legs piceous, only the fore coxæ apically paler, hind femora with distinct hairs on basal half of ventral surface, mid tibial bristles small, those on hind tibiæ distinct and of moderate size from one-fourth from base to about one-third from apex, those on the latter part very small and crowded; wings brownish, more distinctly towards base and fore-margin, costa to middle, first division equal to the other two together, third division not one-fourth as long as second, fringe fine, but long, and closely placed, fourth vein leaving at slightly beyond fork with a distinct bend and running nearly straight to slightly in front of wing tip; halteres brownish black.

Length, 4 mm.

One female, Ithaca, New York, April, 1901. This specimen was sent by Prof. O. A. Johannsen, after whom I have named it.

Type.—Cat. No. 14865, U.S.N.M.

APHIOCHÆTA BRUNNIPES, new species.

Male.—In color identical with the foregoing species but differs in having the antennæ very large, nearly one-half as large as the eye, the palpi much smaller and with more numerous and stronger bristles, the bristles on the scutellum are not on the margin, but on the disk, the posterior pair being near the center and almost in line transversely with the anterior pair; the second abdominal segment is not noticeably lengthened or dilated, and the bristles on the lateral margins are small (3–4) and hair-like; the hind tibial setulæ are weaker, and less in number and not so noticeably reduced on the apical third; the costa reaches to the wing middle, and the third division is about one-third as long as the second, the hypopygium is large and the apex of ventral surface is highly polished; the anal protuberance is grayish.

Length, 2½ mm.

There are two males in the collection from Plummers Island, Maryland, March 26, 1905 (E. A. Schwarz).

I had some doubt about this insect being distinct from the preceding species, but the differences except in the size of the antennal joint and the hind tibial setulæ are not such as are generally found between the sexes of one species and I have decided that it is better to keep them separate meantime, as there is every probability that they are distinct species.

Type.—Cat. No. 14866, U.S.N.M.

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APHIOCHÆTA IROQUOIANA, new species.

Female.—Black, distinctly shining; frons shining, lower post-antennal bristles about three-fourths as large as upper pair, arrangement of bristles as in *johannseni*, antennæ normal, arista pubescent, short, about one-fourth longer than frons, palpi yellow, rather strongly and numerously bristled; thorax shining, several additional bristles on posterior margin, but they are rather weak, four nearly equal scutellar bristles, the anterior pair being a little weaker than the posterior pair; abdomen dull black, more shining towards the apex, bristles on lateral margins of second segment small and indistinct; legs piceous, fore coxæ, fore legs, mid tibiæ, and bases of mid and hind femora yellowish, mid tibial bristles indistinct, those on hind tibiæ widely placed and weak, very indistinct on basal third; wings grayish, costa short of middle, first division nearly three times as long as second, third more than half as long as second, fringe long, fourth vein leaving at rather beyond fork with a slight bend and running nearly straight to much in front of wing tip, a distinct bristle at base of third vein; halteres yellow.

Length, 1½ mm.

One female, Ithaca, New York (O. A. Johannsen); one female, Detroit, Michigan (no collector's name). No date on either.

Type.—Cat. No. 14867, U.S.N.M.

APHIOCHÆTA URSINA, new species.

Male.—Very similar to the foregoing but larger; the bristles on hind margin of thorax are not so numerous, in the specimen before me only the dorso-centrals are present, and those are stronger than in *iroquoiana*, the anterior pair of scutellar bristles are at least as strong as the posterior pair; the lateral bristles on second segment are weak and the sixth segment has several long hair-like preapical bristles; the legs are piceous, the hind tibial setulæ as in previous species; the wings have the costa to near the middle, the first division about two and one-half times the length of second, third nearly one-half second, fringe longer than in *iroquoiana*, and the fourth vein as in that species. I can not see any bristles at base of third vein, which is further from the costa on distal half than in the previous species; halteres yellow.

Length, 1¾ mm.

Type.—Cat. No. 14868, U.S.N.M.

One male, London Hill Mine, Bear Lake, British Columbia, July 29, 1903, altitude 7,000 feet. (R. P. Currie.)

There is no doubt about this being distinct from the previous species. Though the front of the head is in so bad condition that it is impossible to say anything definite about the arrangement of bristles, etc., there are sufficient differences to separate it from *iroquoiana* as a quite distinct species.

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APHIOCHÆTA ROSTRATA Melander and Brues.

Female.—Head shining black, especially smooth and polished on the front and vertex; frons with the normal bristles, except that the lower post-antennal pair is absent; frontal suture very distinct; antennæ black, arista distinctly plumose; proboscis piceous, very large and strongly exserted, as long as height of head, slender at base, where the rather small spindle-shaped palpi are inserted, swollen and bifurcated at apex, the bifurcation being produced by a splitting of the apex, by a horizontal slit in proboscis; thorax shining, scutellum with two bristles; abdomen nowhere bristly; legs pale yellow, tarsi sometimes brownish; hind tibiæ very distinctly ciliated and with a single weak apical spur, as have also the middle pair, on the inner side at apex the hind tibiæ have several transverse rows of short black bristles; costa to distinctly beyond middle of wing, first division slightly longer than second, fringe very short, fourth vein evenly arcuate; halteres yellowish, blackened at tip.

Length, 1.5–1.75 mm.

Described from specimens taken at Woods Hole, Massachusetts. It is unrepresented in the collection.

APHIOCHÆTA CATA Melander and Brues.

Male and female.—Head black; frons short, about as wide as long, faintly gray pollinose in male, lower post-antennal bristles absent; antennæ entirely black, enlarged, and ovate in male; in female they are normal in size and slightly yellowish at base, arista pubescent; palpi light yellow, strongly bristled; proboscis of female projecting, stout and horny; thorax shining, scutellum with two bristles; legs yellowish brown, anterior pair paler; posterior femora ciliated on apical half of ventral surface, hind tibiæ without any rows of small bristles on their outer side, four posterior tibiæ each with a single delicate apical spur; costa not quite reaching to middle, first division nearly twice as long as the other two together, fringe very short and close; fourth vein sightly but evenly curved, recurved at extreme tip; halteres yellow in female, piceous in male.

Length, 0.8–1.2 mm.

Described from same locality as *rostrata*. It is unrepresented in collection.

APHIOCHÆTA PROBOSCIDEA, new species.

Plate 36, fig. 2.

Female.—Brown-black; frons black-brown, anteriorly paler, lower post-antennal bristles small but present, central pair of bristles in first row incurved, situated distinctly lower and nearer the center of frons than the outer pair, but much nearer the outer pair than to the upper pair of post-antennals; antennæ small, brown, arista rather

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short and thick, nearly bare; palpi yellow, large and strongly bristled, proboscis long, yellow, chitinous, projecting as far as end of palpi, rather thin; thorax brown, shining, mesopleura bare; scutellum rather broad and short, about three times as broad as long, two widely placed, strong, marginal bristles; abdomen broad at base, rather conical in shape, first segment rather longer than usual, about as long as second, second dilated laterally and with a few weak bristles, sixth segment elongate, very glossy, with several long preapical hairs, apex yellow, ovipositor brown; legs yellow, hind pair darker, hind femora and tibiæ very strong, the dorsal ridge of latter prominent; setulæ (8–9) on apical two-thirds strong; costa to slightly beyond middle, thickened on basal half, first division distinctly longer than other two together, fork of third vein acute, third division about one-fifth as long as second, fringe of moderate length, widely placed and delicate, fourth vein distinctly bent at base and evenly arcuate, ending slightly recurved at much in front of wing tip; halteres whitish yellow.

Length, 2½–3 mm.

One female, Plummers Island, Maryland, August 12, 1905 (E. A. Schwarz); three females, Cabin John Bridge, Maryland, September, 1900 (no collector's name). These latter specimens are rather darker in color than the type, and also a little smaller.

Type.—Cat. No. 14869, U.S.N.M.

APHIOCHÆTA ARIZONENSIS, new species.

Male.—Black, hardly shining; frons dull, lower pair of post-antennal bristles closer together but nearly as strong as upper pair, center pair of bristles in first row nearer to outer bristles than to post-antennals, and not much lower than the outer pair, antennæ large, oval, at least half as large as eye, black, arista nearly bare, of moderate length, palpi black, paler at tip, normal in size and bristling; thorax dull, one very long and strong mesopleural bristle situated rather low on mesopleura, the usual small bristles present; abdomen dull black, segments subequal, no particularly noticeable bristles, anal protuberance small brown-black, two weak terminal hairs; legs black, only the anterior pair brownish, hind tibial setulæ indistinguishable; wings clear, costa to about two-fifths the wing length, first division equal to about twice the other two together, fringe very long on apical two-thirds, fourth vein slightly bent at base and ending at distinctly in front of wing tip, seventh vein indistinct; halteres black.

Length, 1½ mm.

One male, Williams, Arizona, June 30, 1901 (H. S. Barber).

Readily distinguished by its black color and the very large third antennal joint.

Type.—Cat. No. 14870, U.S.N.M.

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APHIOCHÆTA MONTICOLA, new species.

Male.—Black; frons somewhat shining, lower post-antennal bristles two-thirds as large as upper pair, and much closer placed, center pair of bristles in first row in line transversely with upper post-antennal bristles and much lower and nearer center of frons than the outer pair in first row; separated by about equal distances from the outer pair and the upper post-antennals; antennæ small, brown-black, arista thickly but shortly pubescent, and only about one-fourth longer than the frons; palpi brownish yellow, normal in size and bristling; thorax black, slightly shining, mesopleuræ with distinct bristles, one of them distinctly but not greatly longer than the others, which are of irregular lengths; abdomen dull black, segments subequal, no noticeable bristling except on the lateral ventral surfaces of terminal segment where there are a few strong, hair-like bristles, anal protuberance small, yellowish brown; legs yellow, posterior pair brown, hind tibiæ with very weak, widely placed hair-like setulæ; wings broad, brownish tinged, thin veins brown, costa to near middle, first division about twice as long as the other two together, third about half as long as second, fringe sparse and delicate, but longer than fork of third vein, fourth vein slightly bent at base and ending in front of wing tip; halteres black.

Length, 1½ mm.

One male, Kokanee Mountains, British Columbia, 8,000 feet, August 11, 1903 (R. P. Currie).

Type.—Cat. No. 14871, U.S.N.M.

APHIOCHÆTA FRANCONIENSIS, new species.

Plate 37, fig. 7.

Female.—Black-brown; distinctly shining, frons black, paler anteriorly in center in female, two pairs of nearly equal post-antennal bristles, center pair of bristles in first row near to outer pair and not much below them or nearer to center of frons, antennæ brown-black, arista paler, very shortly pubescent, palpi dusky yellow, normal; thorax black-brown, mesopleural bristles pale, small; abdomen brown, segments subequal, no noticeable bristles but numerous short hairs; legs brown, anterior pair paler, hind tibial setulæ indistinct; costa to near the middle, first section about one and one-half times as long as other two together, third about one-third as long as second, fringe long and delicate, fourth vein slightly bent at base and ending with slight upward curve at before apex; halteres brown.

Length, 1 mm.

Standing as *A. fungicola* Coquillett in collection.

Two females, Franconia, New Hampshire; one male same locality; 2 males Mount Washington, New Hampshire (Mrs. A. T. Slosson).

Type.—Cat. No. 14872, U.S.N.M.

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APHIOCHÆTA DUBITATA, new species.

Female.—Black, frons nearly half again as broad as long, gray dusted, lower pair of post-antennal bristles about three-fourths as large as upper pair, center pair of bristles in first row lower than upper pair of post-antennals and much nearer center of frons than outer pair in first row, antennæ rather large, black, arista swollen at base, distinctly pubescent, palpi dark brown, rather numerously bristled, and of rather large size; thorax dull black, mesopleural bristles distinct, abdomen brownish black, segments subequal, not noticeably bristled anywhere, ovipositor brown; legs brownish yellow, apices of anterior coxæ and trochanters yellow, fore legs paler than posterior, posterior tibial setulæ very indistinct; costa to near middle, first division more than twice as long as second, third about one-half as long as second, fringe very long and delicate, fourth vein distinctly bent at base and ending near to wing tip; halteres black.

Length, 2½ mm.

One female, Kokanee Mountains, British Columbia, 8,000 feet, August 11, 1903 (R. P. Currie).

This specimen has the fork of third vein absent in one wing.

Type.—Cat. No. 14873, U.S.N.M.

APHIOCHÆTA DIVERGENS, new species.

Plate 37, fig. 5.

Male and female.—Black; frons about one-fourth longer than broad, distinctly shining, lower post-antennal bristles nearly as large as upper pair, center pair of bristles in first row below the outer pair and nearer center of frons, nearly in line transversely with post-antennals, but nearer to the outer pair in first row than to the post-antennals, antennæ brownish-black, normal, arista distinctly longer than frons, shortly pubescent, palpi yellow, normal; thorax shining, mesopleural bristles distinct; abdomen bare, segments subequal; legs brown, anterior pair paler, fore tarsi slightly thickened, hind tibiæ with very minute setulæ; costa to one-third the wing length, first division twice as long as other two together, third but little shorter than second, fringe short but strong, increasing gradually in size on basal half and of a uniform size on apical half, fourth vein but slightly bent at base and ending much in front of wing tip, fourth and fifth gradually divergent from base to tip; halteres black or brown.

Length, barely 1 mm.

One male, one female, Plummers Island, Maryland, October 25, 1906 (A. K. Fisher); one male, Washington, District of Columbia, September 30, 1912.

Type.—Cat. No. 14874, U.S.N.M.

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There are four specimens from Williams, Arizona, that appear to be identical with the two from Plummers Island, and though they may not belong to this species I can not find any reliable character for separating them.

APHIOCHÆTA ATOMELLA, new species.

Plate 37, fig. 6.

Very similar to *divergens*, but the frons is shorter, being only about as long as broad, and is gray dusted in front, the arista is shorter and more distinctly pubescent; the costa extends nearer to wing middle, is much longer fringed, and has the first division less than twice as long as other two together; the fourth and fifth veins are nearly parallel for about the basal half of their course, and the fourth is slightly recurved at margin. Otherwise as *divergens*.

Three males, Popoff Islands, Alaska, Harriman Expedition (T. Kincaid); one male, Oxbow, Saskatchewan, Canada (F. Knab).

Type.—Cat. No. 14875, U.S.N.M.

This is the species included in Papers from the Harriman Alaska Expedition,[1] as *Phora fungicola* Coquillett, by D. W. Coquillett. It is very different from that species.

APHIOCHÆTA SUBATOMELLA, new species.

Plate 41, fig. 5.

Male.—Similar in most respects to *atomella*, but the frons is broader, the abdomen is deep black, opaque, with narrow pale hind marginal bands to segments; the hypopygium is large, subshining, brownish black, the ventral surface of last segment has some distinct bristles at apex. The costa extends to two-fifths the length of wing; the first division is two and one-half times as long as the other two together; the third is two-thirds as long as second, and the size of the insect is larger, being 1½ mm.

One male, Ithaca, New York (O. A. Johannsen).

Type.—Cat No. 14876, U.S.N.M.

Three specimens from Kaslo, British Columbia (R. P. Currie), seem to belong to this species, but are not in good condition for examination.

APHIOCHÆTA CILIATA Zetterstedt.

Black; frons distinctly shining, longer than broad, lower pair of post-antennal bristles reduced, about one-fourth less than size of upper pair, antennæ brown, arista rather short and thin, but little longer than frons, nearly bare, palpi yellow, normal; thorax slightly shining, mesopleuræ with several short bristles and one very long and strong backwardly-directed one, abdomen rather broad and

[1] Proc. Wash. Acad. Sci. (Diptera), 1900, p. 437.

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short, fourth segment in female very short, only about half as long as third and about one-third as long as fifth; legs dark brown, fore coxæ paler, hind femora and tibiæ strong, tibial setulæ strong and widely placed (9–10); wings brownish, costa just short of wing middle, first division twice as long as second, third one-third as long as second, fourth vein slightly curved at origin and ending with a slight upward sweep at distinctly in front of wing tip, fringe of costa very short and close; halteres yellow.

Length, 1½ mm.

This is an extremely common species all over Europe. I have taken it in large numbers under bark of dead trees in December and January, especially where the beetle *Rhagium bifasciatum* was burrowing. It also is very common about carrion and garbage. The only specimen I have seen from America is one female from Ithaca, New York (O. A. Johannsen). It seems to be identical in every respect with European examples of *ciliata*.

APHIOCHÆTA RETARDATA, new species.

Male.—Shining black; frons glossy black, as long as broad, with numerous fine hairs as well as the usual bristles present, only one distinct pair of post-antennal bristles present, center pair of bristles in first row incurved, distinctly, but not greatly, lower on frons than outer pair and nearly equidistant between them and the post-antennal pair, second row convex, third antennal joint large, round, arista distinctly longer than breadth of frons, very slightly pubescent, palpi narrow, clear yellow, with numerous short, stout, black bristles; thorax shining, scutellum with two strong bristles, mesopleural bristles of equal length, pleuræ brown, paler toward coxæ; abdomen subshining, bare except at apex of sixth segment, where there are some long hair-like bristles, hypopygium brown, a few long hairs on ventral surface, anal protuberance brown, short and stout, with two terminal hairs; legs brown-black, fore pair, trochanters, and bases of femora yellowish, hind legs strong, hind tibial setulæ distinct on apical half, wings brownish tinged, costa distinctly short of middle, first division about one and one-half times as long as other two together, third about two-thirds as long as second, fringe short, fourth vein regularly arcuate and ending distinctly in front of wing tip, halteres yellow.

Length, 1 mm.

One male, Las Vegas, New Mexico (H. S. Barber).

Has a general resemblance to *minor* Zetterstedt, from which the bristly mesopleura separates it, and to *ciliata* Zetterstedt, from which the absence of the long mesopleural bristle distinguishes it.

Type.—Cat. No. 14877, U.S.N.M.

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APHIOCHÆTA APPROXIMATA, new species.

Female.—Black; frons dark, lower pair of post-antennal bristles nearly as large as upper pair, center pair of bristles in first row a little lower than post-antennal upper pair, and much nearer to center of frons than outer pair in first row, which are a little higher than the upper post-antennals; antennæ large, round, arista thick at base, pubescent, palpi brownish yellow, normal; thorax dull, mesopleural bristles of fair size, those on the posterior margin longer; abdomen dull, segments subequal; legs brown, anterior pair paler, hind femora distinctly ciliated on apical half of ventral surface; hind tibial setulæ indistinct except on middle; wings grayish, the small hairs on the disk of wing more numerous than usual and especially along the fore margin and tip, where they form a darker edging to the wing, much as in *conglomerata;* costa to near the middle, first division shorter than the other two together, but longer than second, third one-third as long as second, fringe long, fourth vein bent at base and ending at distinctly in front of wing tip; halteres yellow.

Length, 2½ mm.

Type.—Cat. No. 14878, U.S.N.M.

One female, Chicago, 5–12–99. (No collector's name.)

As in *chætoneura*, there is a small bristle present at base of third vein. There is a second specimen in the collection from Plummers Island, Maryland, which agrees with the type in every way except that the palpi are paler and the dark edging to wing is not so distinct. I have seen a specimen from New Haven, Connecticut (Johnson), that has the wings as in the Maryland specimen.

APHIOCHÆTA VULGATA, new species.

Female.—Dull black, frons distinctly shining, gray dusted anteriorly, lower pair of post-antennal bristles nearly as large as upper pair, center pair in first row a little lower than outer pair but nearer to them than to the post-antennals, outer pair nearly in transverse line with post-antennals, antennæ of normal size, brown-black, arista swollen at base but terminal part very thin and bare, palpi dull tawny yellow, rather large, and strongly bristled; thorax dull, mesopleura with rather long bristles, abdomen dull black, segments subequal, with scattered short hairs but nowhere with noticeable bristles; ovipositor brown; legs brown, only the anterior pair paler, hind femora and tibiæ strong, hind tibial setulæ close and regular, but not very long; costa to middle of wing, first division equal to other two together, third about one-half as long as second, fringe long, fourth vein slightly bent at base and ending with a slight upward curve at distinctly in front of wing tip; halteres yellow.

Length, 1¾ mm.

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Type—Cat. No. 14879, U.S.N.M.

One female Mount Katahdin, Maine, 5,215 feet. August 19, 1902. One female, West St. Louis, Missouri, May 23, 1904 (W. V. Warner). This second specimen has the hind tibial setulæ rather more widely placed and the legs rather paler, but it is immature and not in very good condition for examination. I have also seen one male and one female from Boston, Massachusetts, and one female from Hamilton, New Hampshire (Johnson).

APHIOCHÆTA DIFFICILIS, new species.

Very close to *vulgata*, but brownish black; the frons not shining, the arista paler and more distinctly pubescent, the palpi yellow; the abdomen brownish with paler hind marginal bands to segments; the legs yellow, the posterior pair darker, hind tibiæ not so strong and the setulæ less distinct at apex, and more widely placed than in the type of *vulgata;* it is also not so robust as that species, and the costa is longer in the female, in which sex the first division is hardly as long as the other two together, though in the male it is distinctly longer. In size similar to *vulgata*.

Two males and one female, Beverly, Massachusetts, June–August, 1870. (No collector's name.)

One female evidently the same species with label "N. C." One male from Ithaca, New York (O. A. Johannsen).

Type—Cat. No. 14880, U.S.N.M.

APHIOCHÆTA ANOMALA, new species.

Male and female.—Brownish black; frons black, both pairs of post-antennal bristles about equal in size, upper directly in line above lower pair, the center pair of bristles in first row nearly in transverse line with the outer pair and much nearer to them than to the post antennal bristles; antennæ brown, arista paler and slightly pubescent, palpi yellow, rather thickly bristled; thorax brown, in addition to the scutellar bristles there are two fine hairs anterior to them; mesopleura with a large portion of the upper posterior angle covered with short bristles, female abdomen with segments subequal and a few scattered hairs, male abdomen with the last three segments haired laterally, hypopigium large, anal protuberance small, legs and coxæ yellow, hind tibiæ with distinct setulæ which are longest on the middle; costa to middle of wing, first division about as long as other two together, third less than one-third as long as second, fringe very long and strong, fourth vein leaving at fork with a distinct bend and ending with a slight upward bend at distinctly in front of wing tip; halteres yellow.

Length, 3½ mm.

Type.—Cat. No. 14881, U.S.N.M.

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One female, Mount Washington, New Hampshire (collection Coquillett), among the duplicates of *A. rufipes* Meigen in collection. One male, White Mountains (Morrison).

May be confounded with *sublutea*, new species, but the larger post-antennal bristles and very long fringe, as well as the darker color should be enough to separate them easily.

APHIOCHÆTA SUBOBSCURATA, new species.

Female.—Similar to the previous species but differing in having the frons rather narrower and longer, nearly as long as wide, pale in center anteriorly, the post-antennal bristles closer together, the center pair of bristles in front row lower on frons than outer pair and further toward the center; the pleuræ are lighter in color, especially anteriorly, and the margin of thorax is paler; the first costal division is distinctly longer than the other two together, the third is rather more than one-half as long as second, the fringe is shorter, the bristles being only as long as fork of third vein and not twice as long as in *anomala*, the fourth vein leaves at distinctly beyond the fork of third, otherwise as *anomala*.

One female, Mount Washington (collection Coquillett).

I do not think that this can possibly be a variation of *anomala*, as it differs so much in important characters.

Type.—Cat. No. 14882, U.S.N.M.

APHIOCHÆTA FUNGICOLA Coquillett.

Brown or black-brown; frons longer than broad, brown, paler anteriorly, with numerous pale hairs, in the only one of the type-specimens that preserves the frontal bristles in any degree intact they seem to be arranged as in *furtiva*, antennæ brown, paler at base, arista paler than third joint of antennæ, slightly pubescent, palpi yellow, normal; thorax shining, black to brown and in immature specimens yellowish; abdomen brown, second segment slightly elongate, others subequal, no noticeable bristles present, legs yellow, hind tibiæ with dorsal ridge, but setulæ very weak and indistinct; costa to just about middle in female, rather shorter in male, first division about one-third longer than other two in male, but just a trifle longer in female, fringe short and delicate, fourth vein slightly curved at base and ending distinctly in front of wing tip; halteres black or black brown.

Length, 1–1½ mm.

This species comes close in appearance to *A. aletiæ* Comstock, but may be separated from it by the characters given in description. I believe that the color of the halteres in this species is constant, at least it is in all the specimens in the collection, and that the variety mentioned by Brues really was *aletiæ* Comstock, or some closely allied species. There are six specimens in the collection (the types)

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representing both sexes, reared from *Trametis pecki* in which a Coleopteron belonging to the genus *Cis* was also found.

Locality, Las Cruces, New Mexico (Cockerell). I can not find any other specimens in the material here, and such records of it having occurred elsewhere than at Las Cruces as I can investigate do not apply to *fungicola*.

APHIOCHÆTA FURTIVA Aldrich.

Female.—Black, shining; frons about one-third longer than broad, shining, and with numerous short hairs, lower post-antennal bristles about three-fourths as large as upper pair and occupying about one-seventh the width of frons, upper occupying two-fifths, center bristles in first row not much further from eye margins than outer pair which are much higher placed, second pair in center row about one-fourth of the distance between ocellar triangle and upper post-antennals; thorax shining brown-black, the humeri paler; abdomen rather broad and short, segments subequal, no conspicuous bristles and but few hairs present; legs yellow, posterior femora and tibiæ darker, mid tibiæ with two serial rows of setulæ, one on the antero-and one on the postero-dorsal surfaces, hind tibiæ strong, the dorsal ridge prominent, setulæ (8–9) strong and widely placed; wings nearly clear, costa to slightly beyond middle, first division equal to other two together, third about one-fourth as long as second, fringe very short and delicate, fourth vein but little curved at base and running slightly upward to much in front of wing tip; halteres black, pedicel paler.

Length, 2 mm.

Type-specimen.—In poor condition. St. Vincent, West Indies.

APHIOCHÆTA BICOLORATA, new species.

Female.—Glossy black; frons highly polished, about one and one-half times as long as broad, one pair of long post-antennal bristles, center pair of bristles in first row incurved, placed much lower on frons than outer pair and distinctly nearer to center, a few scattered hairs on frons besides the usual bristles, antennæ oval, rather pointed, opaque black, arista pubescent, at least one and one-half times as long as frons, labrum very much produced, viewed from above extending beyond anterior extremity of antennæ, glossy black, rounded in front, proboscis fleshy, not extending beyond apex of labrum, palpi brown-black, as long as labrum and numerously bristled; mesonotum glossy black, disk with numerous short hairs and on posterior margin about six long bristles, the strongest of which is situated close to wing base, pleuræ highly polished, brown-black, changing to bright yellow on lower half, scutellum with two strong bristles and two weak hairs anterior to them; abdomen subopaque, second, third, and seventh segments elongated, the first two sub-

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equal, no distinct bristles present; legs and coxæ pale yellow, fore tarsi, a spot behind mid coxæ, and apices of hind femora blackened, fore tarsi uniformly thickened, but not broader than and nearly twice as long as tibiæ, mid tibial setulæ short and weak, hind tibiæ with a regular series of short but distinct setulæ; wings browned, especially along veins, costa to about four-sevenths of the wing length, all veins brown, first costal division shorter than second and third together, third about two-thirds as long as second, fork nearly at right angles with third vein, fourth vein leaving at midway from fork to tip of third, regularly arcuate and ending before wing tip, fringe very short, barely longer than diameter of costal vein; halteres with yellow stalk and black knob.

Length, 1½ mm.

Type.—Cat. No. 15242, U.S.N.M.

Locality, Plummers Island, Maryland, August 3, 1912 (J. R. Malloch). One female.

This species comes close to *furtiva* Aldrich, but may be separated from that species by the position of the frontal bristles, the length of the costal divisions and several other characters given in the above description.

APHIOCHÆTA CONSPICUALIS, new species.

Female.—Black, distinctly shining; frons dull, about one-half broader than long, lower post-antennal bristles about one-half as large as upper pair, center pair of bristles in first row but little lower than the outer pair in first row, which are in transverse line with the upper post-antennals, and nearer to them than to the post-antennal bristles, antennæ brown-black, rather small, arista twice as long as frons, pubescent, palpi yellow, large and strongly bristled; thorax shining black, pleuræ brown, paler on lower portions next to coxæ, glossy; abdomen brown-black, dull, segments 2 and 5 slightly elongate, only a few weak hairs present, terminal segment and ovipositor rather hairy, apical half of venter yellowish; coxæ yellow, legs and especially apices of hind femora darker, hind tibiæ ciliated with closely placed, weak hairs; wings fuscous, costa to fully the middle, distinctly thickened on apical two-thirds, thickest at apex of first vein, first division distinctly longer than second and as long as second and third together, third half as long as second, fringe long but delicate, fourth vein leaving at much beyond fork of third with a distinct curve and ending distinctly in front of wing tip, all thin veins brown and distinct; halteres brown.

Length, 3 mm.

Two females, types, from Eureka, California (H. S. Barber), and one from San Mateo County, California, Baker. This last specimen is rather immature and has the wings, legs, and halteres paler in color than the type.

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Type.—Cat. No. 14883, U.S.N.M.

Close to *tumida* Wood, but a larger insect and in several respects differing from that species.

APHIOCHÆTA INORNATA, new species.

Male.—Black, hardly shining; frons about one-half broader than long, lower post-antennal bristles half as large as upper pair, which are rather closely placed, center pair in first row nearer to outer pair than to post-antennals but not much below them, antennæ black, of moderate size, arista twice as long as frons, pubescent, palpi brownish black, rather large and strongly bristled; thorax hardly shining, pleuræ not glossy except the lower half of mesopleura which is polished; abdomen dull black, segments subequal, with numerous scattered hairs present on all segments, those on the preapical row dorsally, and on the latero-ventral surfaces of sixth segment very much stronger than elsewhere on abdomen, anal protuberance small and retracted, black-brown; legs brown, only the coxæ at tips and fore legs paler, hind tibiæ with distinct dorsal ridge, no setulæ, only very numerous weak hairs present; wings grayish, costa to middle, first division as long as other two together, third half as long as second, mediastinal vein reaching to beyond middle of first vein, fringe weak on basal third but long and close on remainder, fourth vein leaving at distinctly beyond fork with a slight bend and ending distinctly in front of wing tip; halteres black.

Length, 2½ mm.

Type.—Cat. No. 14884, U.S.N.M.

Two males, Ithaca, New York (O. A. Johannsen).

At first I was led to suppose that this was the male of *conspicualis*, but the differences in structure were too evident, apart from the widely separated localities where the insect occurred, to permit of one placing them together. However, it is not at all unlikely that the male of *conspicualis* has the costa normal, and that the female of *inornata* has it swollen as in *conspicualis*. There are several European species closely allied to those that have this sexual distinction.

APHIOCHÆTA BOREALIS, new species.

Male.—Black, shining; frons shining, longer than broad, rather thickly covered with short hairs in addition to the usual bristles, lower pair of post-antennals about one-half as large as upper, situated much closer but not much lower than upper, center pair of first row nearly in transverse line with upper post-antennals and not much further from eye margin than the outer pair, which are situated much higher on frons, center pair of bristles in second row about one-fourth of the distance between anterior ocellus and post-antennal upper bristles; antennæ normal, brown-black, arista thread-like

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except at base, about one-third longer than frons, slightly pubescent, palpi yellow, normal; thorax shining, lower half of pleuræ glossy brown, abdomen dull black, segments subequal, nearly bare; legs yellow, hind femora darker, hind tibial setulæ (9–10) very weak and widely placed; wings clear, costa to just short of middle, first division about twice as long as second, third about two-thirds as long as second, fringe long but delicate, shorter toward base of costa, fourth vein slightly curved at base and ending recurved at much in front of wing tip; halteres black.

Length, 1 mm.

Type.—Cat. No. 14885, U.S.N.M.

One male Kaslo, British Columbia, July 8, 1903 (R. P. Currie).

APHIOCHÆTA RUSTICATA, new species.

Female.—Black, shining; frons distinctly broader than long, only a few scattered fine hairs besides the bristles present, lower post-antennal bristles three-fourths as large as upper pair, situated as in table, center pair in first row nearer to outer pair than to post-antennals and very little below the former which are if anything a trifle below the post-antennal pair transversely, antennæ of rather more than the normal size, arista one and one-half times as long as frons, slightly pubescent, palpi black, of rather large size and strongly bristled; thorax shining, lower half of pleuræ glossy; abdomen dull black, segments subequal, numerous scattered short hairs on all segments, legs black-brown, no distinct hind tibial setulæ, wings brownish, thin veins distinct on disk but indistinct at near margin, costa short of middle, first division rather more than one and one-half times as long as other two together, third two-thirds as long as second, fringe long and delicate on distal two-thirds, short on basal third, fourth vein with a slight bend at base and nearly straight on remainder, ending before wing tip; halteres black.

Length, 2 mm.

Type.—Cat. No. 14886, U.S.N.M.

Female, Corvallis, Oregon, May 5, 1896 (332). (No collector's name.)

APHIOCHÆTA PERPLEXA, new species.

Female.—Very close to *rusticata* but smaller and deeper black, the halteres are black and the legs entirely so in the type; the hind tibiæ have the hairs on the postero-dorsal surface more distinct and the ridge more pronounced than *rusticata;* the abdomen is also nearly bare and the long hairs on ovipositor and ventral surface at tip are not distinct in *perplexa*. I had originally put one specimen along with the type of *rusticata* with some doubt, but a second specimen I have since discovered has caused me to change my table as it is quite evidently distinct from that species. It is unfortunate that

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there are no males of either species in the collection, as that sex will in all probability show more reliable and distinct differences than the female.

Locality.—London Hill Mine, Bear Lake, Kaslo, British Columbia; altitude, 7,000 feet; July 21, 1903 (R. P. Currie).

Type.—Cat. No. 14887, U.S.N.M.

APHIOCHÆTA INFUMATA, new species.

Plate 37, fig. 2.

Male.—Black, hardly shining; frons dull, about one-third broader than long, only one pair of post-antennal bristles present, center pair of bristles in first row lower on frons than post-antennal pair and much nearer the center of frons than the outer pair in first row, which are higher placed than the post-antennals, frontal suture distinct, but narrow; antennæ large, velvety black-brown, arista black, rather thick and short, indistinctly pubescent; palpi yellow, rather narrow and shortly but strongly bristled; thorax black, humeri and prothorax yellow and polished, mesopleura bare; two strong scutellar bristles; abdomen dull black, segments subequal, sixth with a few preapical long bristles, anal protuberance large and yellow, with a few scattered hairs and two somewhat long, curled terminal hairs; legs and coxæ yellow, hind femora at apices, and hind tibiæ darker, hind tibial setulæ (8–9) on basal two-thirds large and distinct, hair-like on apical third; wings fuscous, especially on fore margin, costa to well beyond middle, first division nearly as long as second, third about one-fourth as long as second, fringe moderately long, as long as fork of third vein, fourth vein leaving at beyond fork of third with a distinct bend and running nearly straight to a little in front of wing tip, fifth ending farther from wing tip than the fourth; halteres yellow.

Length, 3½ mm.

Type.—Cat. No. 14888, U.S.N.M.

One male, San Mateo County, California (C. F. Baker).

A very conspicuous species, easily distinguished by the very dark wings and long costa. If the female conforms to the general rule in this genus, the first costal division should be distinctly shorter than the second.

APHIOCHÆTA CHÆTONEURA, new species.

Male and female.—Brown, distinctly shining; frons long, one half longer than broad, black-brown, polished, lower post-antennal bristles but little smaller than the upper pair, which are widely placed, center pair of bristles in first row very close to eye margin and much lower on frons than outer pair in first row, so that they are nearly directly below them; frontal suture fine but distinct; antennæ brown, arista slightly longer than frons, distinctly pubescent; palpi

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pale yellow, of normal size and bristling; thorax deep reddish brown, rather polished, narrow; mesopleura bare, scutellum with two bristles, pleuræ paler than thorax, shining; abdomen brown, rather dull, segments subequal, several weak bristles on lateral margins of second segment, venter or female pale yellow; legs yellow, apices of hind femora broadly dark brown, hind femora broad, hind tibial setulæ distinct, longest on middle; wings distinctly infuscated especially along the veins, costa to beyond middle, first division in male slightly longer than second, third about three-fourths as long as second, in female first and second nearly equal, third about one-half second, a distinct bristle at base of third vein, fringe rather short and sparse, base of third vein near to costa and the basal costal cells narrow, fourth vein slightly curved at origin and ending before wing tip; halteres yellow.

Length, 1–1½ mm.

Type.—Cat. No. 14889, U.S.N.M.

A small, very slim, and distinctly shining species that may find its way in the paler forms into the section with yellow thorax, but it is more closely allied to *minor* and the smaller species in this section than to those in the *scalaris* section. Four specimens in collection were standing as *A. giraudii* Egger, to which they bear no resemblance. The diary notes are "No. 978—*A. Giraudii*, orig. spec. exam. det. Brues." Note by Pergande, "1st Sept. 1881; Today issued three of these flies from a pupa which was found dead in stem of rice, rec. from L. O. Howard, Aug. 22nd from Atlanta, Ga. (*Chaetopsis aenea*, Wied.)." Fourth specimen. Note 374–x04. "Orig. spec. exam. det. Brues." No notes as to locality or habitat. If these are the specimens on which the American occurrence of this species rests then it must be removed from the list. Three specimens labeled Ohio, without other data, standing among the unidentified material.

APHIOCHÆTA CAVERNICOLA Brues.

Black or piceous; frons fully twice as broad as long, subshining, post-antennal pair of bristles very long and stout and more nearly porrect than is usual in this genus, following two rows slightly curved downward, ocelli placed on a tubercle, frontal suture present, antennal cavity large and deep, antennæ brownish yellow, of moderate size, arista long, pubescent, palpi large, and rather slender, with the usual bristles, proboscis retracted; thorax piceous, subshining, no conspicuous bristles except the pair of dorso-central ones and a single one in front of each wing base; abdomen long and narrow, black, bare except for a few scattered short hairs in male, male hypopygium small, the small lamella triangular and scarcely projecting; legs slender, testaceous yellow, tibiæ bare except for a slight trace of ciliation on hind pair; wings very large, tinged with brownish, costa a little beyond middle, fringe moderately long and thickly placed,

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first division equal to other two together, fork of third vein not very acute, fourth vein strongly curved basally and straight apically, ending closer to wing tip than fifth; halteres pale yellow.

Length, 2–2¾ mm.

Described from specimens of both sexes. Localities: Wyandotte Cave, Indiana (Aldrich), and Mayfields Cave, near Bloomington, Indiana (Banta). Types in Milwaukee Public Museum. Brues states that "Aldrich recorded as *A. nigriceps* Loew what were presumably specimens from the lot described from Wyandotte Cave, with the following note by Blatchley: "Taken from the mouldy remains of bread, chickens, etc., near the 'Augur Hole' three-fourths of a mile from the mouth."

I have found two specimens in the series of *A. rufipes* Meigen, in collection that are referable to this species. They answer to the description in every way, but I note that the mid tibia has more distinct setulæ than the hind.

Locality.—Mammoth Cave, Kentucky. No other data.

APHIOCHÆTA PEREGRINA, new species.

Male.—Black-brown; frons broader than long, lower post-antennal bristles not half as large as upper and very low down, the bristles in first row forming a convex row with the upper post-antennals on very near the anterior margin of frons, center pair in second row noticeably lower on frons than the outer pair, antennæ black, of normal size, arista not twice as long as frons, pubescent, palpi yellow, normal, dorsum of thorax black-brown, humeri and pleuræ reddish yellow, a darker brown streak over pleuræ beneath wing base; abdomen black, segments subequal, no noticeable bristles present, numerous hairs on apical segment, hypopygium with two projecting ventral processes, anal protuberance small, inconspicuous, yellow; legs yellow, hind tibial setulæ numerous but very small and indistinct, a few long hairs on basal half of ventral surface of hind femora; wings grayish, costa to distinctly beyond the middle, first division as long as the other two, third about one-third as long as second, fringe long but delicate, fourth vein distinctly bent at base and ending rather nearer to wing tip than fifth; halteres yellow.

Length, 1½ mm.

Type.—Cat. No. 14890, U.S.N.M.

One specimen labeled "D. C. Collection Coquillett." No other data. It was standing among the duplicate series of *A. rufipes* Meigen.

A female from Cabin John Bridge, Maryland (Knab and Malloch), probably belongs to this species though much darker in color.

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APHIOCHÆTA DYARI, new species.

Male.—Black, hardly shining; frons about one-fourth broader than long, frontal bristles long, except the post-antennal pair, which are strong, and only about one-third as long as the others, frons convex anteriorly, the bristles of first row very near the anterior margin, the outer pair being almost as close to margin as the center pair, which are much closer to the post-antennals than to the outer pair, antennæ rather large, nearly half as large as the eye, and round, arista short and thick, about as long as breadth of frons, indistinctly pubescent; palpi pale yellow, normal; thorax hardly shining, pleuræ glossy on the lower half; abdomen dull black, segments subequal, only the sixth segment with distinct pre-apical bristles, hypopygium rather large, brown, anal protuberance of average size, yellow, with scattered hairs and two terminal long bristles; legs dusky yellow, hind femora strong, brown, with rather long soft hairs on basal half of ventral surface, hind tibial dorsal ridge distinct, setulæ on apical half (4–5) rather widely placed and distinct; costa to near middle, first division more than twice as long as second, third barely one-half as long as second, fringe longer than fork of third vein but delicate, fourth vein distinctly bent at base and ending with a slight upward bend at distinctly in front of wing tip; halteres yellow.

Length, 2½ mm.

Type.—Cat. No. 14891, U.S.N.M.

One male, Kaslo, British Columbia (H. G. Dyar).

A very distinct species, resembling in most respects the group with four bristles on the scutellum.

APHIOCHÆTA FLAVINERVIS, new species.

Female.—Brownish black, slightly shining; frons brown, gray dusted, bristles arranged much as in *dyari* but the post-antennal pair are much larger and wider apart, occupying about one-fourth the width of frons as against one-sixth in *dyari*, the antennæ are brownish and of rather small size, the arista is little longer than breadth of frons but more distinctly pubescent than in *dyari*, the palpi are yellow and normal; thorax brownish, slightly shining, humeri yellow; abdomen brown, apices of segments narrowly paler, segments subequal, no noticeable bristles present; legs yellow, tips of hind femora and tips of posterior surfaces of hind tibiæ dark brown, mid tibiæ with short setulæ, hind tibiæ and femora strong, the former with distinct dorsal ridge and distinct setulæ which are longest on middle; costa to about two-fifths of wing length, thick veins flavous, first costal division three times as long as second, third division half as long as second, fringe about as long as fork of third vein and very delicate, fourth vein nearly straight at base and ending much in front of wing tip, thin veins very fine but distinct; halteres yellow.

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Length, 2 mm.

Type.—Cat. No. 14892, U.S.N.M.

One female, Cabin John Bridge, Maryland, September 19, 1900; no other data. Labeled "*Phora rufipes* Meig."

I took a male while collecting at this same locality on April 28, 1912, along with Mr. F. Knab, which belongs, I believe, to this species. It is decidedly darker in color and the lower post-antennal bristles are present, though small.

APHIOCHÆTA MINOR Zetterstedt (=MINUTA Aldrich).

Shining black species; frons longer than broad, highly polished, post-antennal bristles of equal size, the upper pair much wider apart than the lower, center pair of bristles in first row much below the outer pair, and hardly further from eye-margin, arista short, barely as long as frons, male palpi large, black or brown, female normal, yellow; legs black, only fore coxæ in male, and fore coxæ and fore legs in female yellowish, hind tibial setulæ rather distinct and widely separated in male, more crowded and indistinct in female; wings dusky, male costa short of middle, female to the middle, first division half again as long as second, fringe very short, fourth vein nearly straight at base; halteres yellow.

Length, 1–1½ mm.

In collection: Aldrich's type of *minuta*, Brookings, South Dakota. One male, Biscayne Bay, Florida, and one female, Mount Washington, New Hampshire (Mrs. A. T. Slosson).

APHIOCHÆTA RUFIPES Meigen.

Black or brown; frons dull, nearly twice as broad as long, post-antennal bristles very strong, the lower pair as large as the upper and situated very close to them, palpi yellow, normal; thorax black or brown, hardly shining; abdomen black, in male very narrow and slender, with very long scale-like hairs on lateral and posterior margins of segments, hypopygium short, anal protuberance inconspicuous; female abdomen of normal shape and with only scattered hairs; legs yellow to brown, hind femora darker, hind tibiæ with numerous closely placed weak hairs on postero-dorsal surface; wings yellowish, costa to middle, first division twice as long as second in male, barely that in female, fork of third vein acute in female, but less so in male, fourth vein bent at base, but not very distinctly so, fringe very long and strong; halteres yellow.

Length, 2½–3 mm.

Probably the commonest species of the genus; met with all over Europe as well as America. It may be met with during every month in the year, and I have seen it active (in a house) in western Canada in November. It is very commonly found in beehives, and is a scavenger

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rather than an inquiline or parasite. There is only one species with the characteristic scale-like hairs besides this, namely, *hirtiventris* Wood, but in that species the hind tibiæ have the apical third shaped much as in *albidohalteris* Felt.

Represented in the collection by specimens from the District of Columbia, Massachusetts, Maryland, California; Kaslo, British Columbia; Toronto, Canada; and England.

APHIOCHÆTA PULICARIA Fallen.

Variable in color, but generally brown or brownish black; frons black, about one-half broader than long, post-antennal bristles of nearly equal size, palpi yellow, normal; abdomen not slender as in *rufipes*, but of the normal shape in male, segments subequal, anal protuberance in male small and inconspicuous, ventral plate of the hypopygium large and distinctly visible; legs yellow, more or less tinged with brown, no long hairs on ventral surface of hind femora; wings tinged with yellowish-brown, especially in female, costa quite to middle, fringe not so long as in *rufipes*, first division longer than second but never longer than second and third together, angle of fork not so acute as in *rufipes*, variable sexually, fourth vein strongly curved at base, more so in female; halteres yellow.

Length, 1½–2 mm.

There is a specimen in the collection bearing this name which agrees with description given above.

Locality.—Plummers Island, Maryland, November 3, 1906 (A. K. Fisher). It has been recorded by Brues from Massachusetts, Louisiana, South Dakota, Idaho, and California. This species is very similar to *evarthæ*, but in *evarthæ* the female especially has the first division distinctly longer than the other two together. The arrangement of the frontal bristles is the same in both species, that is, the post-antennals are close together, and the center pair in first row are but little lower than the outer pair, being much nearer center of frons than the other pair, but nearer to them than to the post-antennal upper pair.

APHIOCHÆTA SETACEA Aldrich.

Plate 37, fig. 8.

Male and female.—Black-brown, hardly shining, frons about as long as broad, dull, and with numerous short hairs in addition to the ordinary bristles, lower pair of post-antennals nearly as large as upper pair and closer placed, center pair of bristles in first row directed toward center of frons, distinctly lower than outer pair and noticeably further from eye-margin, antennæ rather small, black, arista black, nearly bare, and hardly longer than frons, palpi yellow, normal; thorax black brown, hardly shining, pleuræ paler toward coxæ;

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abdomen black (brownish in female), tapering in male, and with the second segment elongated and broadest posteriorly, sixth segment elongate and with a few hair-like preapical bristles, hypopygium with ventral processes distinct, anal protuberance small, yellow, with the terminal hairs weak, female abdomen with segments subequal, hind femora strong, darkened, no distinct setulæ except some of those on the middle of the hind tibiæ in male which are rather stronger than elsewhere on tibiæ, wings yellowish, costa distinctly short of middle, first division distinctly longer than other two together, fringe short, not much longer at its longest part than twice the diameter of costa, fourth vein nearly straight at base and running slightly upward on apical half, ending distinctly in front of wing tip, fifth vein regularly divergent from fourth; halteres yellowish white.

Length, 1–1¼ mm.

There has been considerable confusion regarding this species. Aldrich described *setacea* from one male and four females, taken at Brookings, South Dakota.[1] Afterwards Brues writes[2] that Aldrich had females of *A. agarici*, Lintner, and not of *setacea* which was a distinct species represented by the male (type). This type-specimen is now before me. Brues states that several of his specimens are considerably larger than the type (2–2½ mm.), which leads me to suppose that he had also two species before him. This supposition is strengthened by reference to his description of the species which cannot have been drawn from the type, as will be seen if his description is compared with the foregoing and his drawing of the wing with that given herewith. I am confident that the larger specimens he mentions belong to some other species, because they evidently had a much broader frons, a longer fringed costa, and were twice as large as the type which being a female, and not as he supposed a male, would represent the largest sex as is always the case in this group. There is in most species a very small amount of variation in the size except as between the sexes, and though it would be bad policy to describe a species as new because it only differed from a known species in the matter of size, when there are, as in this case, so pronounced differences it is quite conceivable that there has been a mistake made. There is besides the female already mentioned one male from Washington, District of Columbia (collection Coquillett); no other data.

APHIOCHÆTA ALBIDOHALTERIS Fell.

Male and female.—Black subshining; frons distinctly broader than long, lower pair of post-antennal bristles very minute, the upper pair of moderate size, bristles of first row forming an almost straight transverse line with the post-antennal pair, antennæ in male rather larger than normal, in female normal, palpi yellow, normal; thorax

[1] Can. Ent., vol. 24, p. 144. [2] Trans. Amer. Ent. Soc., vol. 29, p. 370.

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slightly shining, abdomen dull black with scattered hairs in both sexes and the segments subequal, no noticeably longer or shorter segments in either sex, except, as is usual, the sixth in male which is slightly elongate, the hypopygium of male with several strong bristles on lateral angles and a few on the sides, anal protuberance stout and rather short; legs dusky yellow, especially the dorsal and ventral surfaces of hind femora, hind tibiæ with a dorsal ridge which divides at about apical third to inclose a flattened surface which extends to apex in male, the female has an indication of a flattening at same part, but it is not so distinct as to be very noticeable, and unless the sexes are associated it is difficult to distinguish the female from *agarici* and its allies; wings clear, costa to short of middle in male, to near middle or to middle in female, first division fully twice as long as second, third half as long as second in both sexes, fringe long, fourth vein slightly bent at base and slightly recurved at margin of wing; halteres yellow.

Length, 1¼–2 mm.

A very large number of specimens belonging to this species have been reared from fungi in connection with the Mushroom Investigation, under the Bureau of Entomology. The localities are the District of Columbia, from *Agaricus campestris* (Popenoe), and from *Coprinus comatus* (Wall) a pair on windows in museum May 17, 1912 (Knab and Malloch) and Sandusky, Ohio, from *Agaricus campestris* (Vaihmeyer). Specimens in collection marked "from mushrooms," District of Columbia, 1902, and New Jersey, 1895. The fact that these specimens were reared from *Agaricus* led me to suppose that this was identical with the next species, but Mr. Brues informs me that his species differs in the characters mentioned in table as to the abdominal bristling, and that "the hind tibiæ are also more swollen, and the peculiar cut-off part extends farther toward the outer edge" (antero-dorsal surface?). He however makes no mention of the costal lengths in the two species when he compared his with the specimens sent by Wood, though I have included it in my table. This is the same as the species described by Wood as *derasa*,[1] It was described originally by Felt from the female and an examination of some of Prof. C. W. Johnson's cotypes proves it to belong to this male. There was at least one male among the cotypes which I examined.

APHIOCHÆTA SMITHII Brues.

Male.—Black, frons slightly pollinose, suture and ocellar tubercule present, only two distinct post-antennal bristles, outer pair of bristles in first row very low down, near the anterior lateral angle of frons, outer bristles in second row very near to eye-margin; third

[1] Ent. Mo., May, 1909.

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antennal joint oval, slightly more elongate than usual, with a long almost entirely bare arista, palpi clear yellow, normal size, with numerous but small bristles; thorax subshining, very much more distinctly punctuate than usual, thinly hairy; abdomen opaque, the segments gradually decreasing in length, the second not elongated and without lateral tufts of bristles, entire abdomen with sparse, short, bristly hairs; legs slender, brownish testaceous, the four posterior coxæ and hind femora more or less infuscated, tibiæ destitute of distinct setulæ, the hind ones with a raised dorsal ridge that divides at about apical third to inclose a peculiar oval, flattened, or concave area, which extends to the tip of the tibiæ; wings hyaline, costal vein reaching distinctly beyond middle of wing, first division fully twice as long as other two together, third division slightly shorter than second, fringe quite long and closely placed, fourth vein slightly and evenly curved; knob of halteres whitish.

Length, 1.2 mm.

Described by Brues[1] from two specimens reared June 21, (1909?) by Prof. J. B. Smith from an agaric mushroom, Stelton, New Jersey.

I have altered the reading, but not the substance of the description to make it conform to that of other species in this paper. (See note under last species.

APHIOCHÆTA FUSCOPEDUNCULATA, new species.

Female.—Black, shining; frons distinctly longer than broad, shining, thickly covered with short hairs in addition to the usual bristles, lower pair of post-antennal bristles half as large as the large upper pair, first row with center pair of bristles nearly in transverse line with the upper post-antennals and about midway between them and the eye margin, outer pair very close to eye margin and much higher on frons than center pair, second row straight, the center pair about one-fifth the distance from ocellar triangle to upper post-antennals, palpi small, brownish, arista about as long as frons, nearly bare, palpi dusky yellow, moderate in size and rather strongly bristled; thorax shining, pleuræ dull black except on the lower two-thirds of mesopleuræ, which is very highly polished, scutellum with two bristles; abdomen hardly shining, segments subequal and except the last almost bare, sixth with very numerous short but no long hairs, legs black, the anterior pair yellowish, only a few long hairs on basal third of ventral surface on hind femora, and one or two of the setulæ near to tip on hind tibiæ distinct, elsewhere short and weakly haired; wings grayish, costa distinctly short of the middle, first division slightly more than twice as long as second, third half as long as second, fringe longer than fork of third vein but delicate, fourth vein evenly arcuate on its whole length and like the fifth

[1] Bull. Wis Nat. Hist. Soc., vol. 7, 1909, p. 107.

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indistinct toward the tip; knob of halteres pale yellow, peduncle brown.

Length, 1¼ mm.

One female June 25, 1903, Kaslo, British Columbia (R. P. Currie).

Type.—Cat. No. 14893, U.S.N.M.

APHIOCHÆTA AGARICI Lintner.

Male and female.—Black subshining; frons distinctly broader than long, upper post-antennal bristles stout but not very long, very close together, lower pair minute or absent, first row of bristles in a slightly convex row with the post-antennal pair, second row convex, center pair nearly one-third the distance from ocellar triangle to post-antennals, antennæ black, of good size in male, smaller in female, arista rather thick and short, slightly longer than breadth of frons, black and nearly bare, palpi brownish, normal; thorax subshining, scutellum with two bristles; abdomen dull, segments laterally with short hairs, sixth with numerous distinct, but not very long hairs, hypopygium small, ventral processes projecting, anal protuberance short and stout, brownish, weakly hairy, terminal hairs weak, legs black or piceous, anterior pair paler, setulæ on hind tibiæ only represented by rather stronger hairs on the extreme tip; wings slightly grayish, costa distinctly short of the middle, first division twice as long as other two together, third barely equal to second (in one specimen much shorter), fourth vein but little bent at base and apex, slightly recurved at apex and ending distinctly in front of wing tip; halteres yellow, peduncle darker.

Length, 1½–2 mm.

A large number of specimens bred from *Agaricus campestris* and *Coprinus comatus*.

Localities.—District of Columbia, New Jersey, and New York. Probably the commonest of the fungus feeding species. Recorded as *Phora minuta* Aldrich, on authority of Dr. L. O. Howard, by Lintner.[1] The identification was made by Coquillett and the specimens are still in collection.

APHIOCHÆTA PYGMÆA Zetterstedt.

Black; frons very slightly shining, slightly broader than long, upper post-antennal bristles large, lower pair very small, center pair of bristles in first row much lower than outer pair, antennæ brownish, arista pubescent, barely longer than frons, palpi yellow, normal; thorax brown; abdoman black, with pale hind margins to segments, nearly bare, segments subequal, anal protuberance small and stout, yellow; legs yellow, hind tibiæ without distinct setulæ, only with rather weak hairs; costa to one-third the length of wing in male,

[1] Tenth Rep. N. Y. State Ent., 1895, p. 403.

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slightly longer in female, first division more than twice as long as other two together, second and third divisions subequal, third vein distinctly thickened at tip, fourth vein hardly bent at base and slightly recurved at tip, ending distinctly in front of wing tip; halteres yellow.

Length, 1–1½ mm.

I have only seen a single specimen that I believe is identical with this European species.

Locality.—Colorado (collection of Coquillett). Brues records it in his paper on the family from Idaho, California, and Texas.

Genus MELALONCHA Brues.

This genus is represented by a single species, *pulchella* Brues, from Songa, Bolivia, South America. Resembles in appearance the species in *Apocephalus* Coquillett, but easily distinguished by the characters given in generic table. I have not seen the species, which is unrepresented in the collection here. It has also been recorded from Paraguay by Brues.

Genus GYMNOPHORA Macquart.

Represented by a single species in North America, which is identified with *arcuata* Meigen, the one commonly met with in Europe. Another species is met with in Paraguay, which is close to *arcuata* Meigen, in appearance. Brues described this South American species[1] under the specific name *colona*. This latter species differs from *arcuata* in having the frontal bristles more distinct and in having black halteres.

Localities of specimens in National Museum collection belonging to *arcuata* Meigen: White Mountains, New Hampshire (Morrison); Victoria, Texas (E. A. Schwarz); Woodside, Maryland (J. E. Benedict, jr.); Mount Washington, New Hampshire (Mrs. A. T. Slosson); Lawrence, Kansas.

The South American species is unrepresented in collection.

Genus PLASTOPHORA Brues.

TABLE OF SPECIES.

1. Larger species; frons as wide as high, proboscis enlarged, as long as height of head, chitinous; length, 1.75 mm ..... *beirne*, p. 501.
   Small species, 1 mm. or less ..... 2.
2. Species about ½ mm. in length, costa to about middle of wing, thorax grayish, hind tibia bare, the middle pair of bristles in second row very close together and higher placed than the outer pair which are very close to eye margin. *formicarum*, p. 501.
   Species 1 mm. in length, costa distinctly short of wing, thorax yellow or brown ... 3.

[1] Ann. Nat. Mus. Hungary, vol. 9, 1911.

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3. Ovipositor very broad, horseshoe shaped, bilobed.....*spatulata*, p. 502.
Ovipositor not horseshoe shaped.....4.
4. Ovipositor more than twice as long as broad at base, the second row of frontal bristles almost straight and nearly equidistant from each other.
crawfordi, p. 501.
Ovipositor of female but one-half longer than broad at base, center pair of bristles in second row placed much higher than outer pair and very close together.
curriei, p. 501.

TABLE OF MALES.

Sixth abdominal segment elongated, without any large bristles, hypopygium weakly haired, anal protuberance not longer than sixth segment.
curriei, p. 501.
Sixth abdominal segment not lengthened, a circle of distinct bristles at beyond middle, several hairs attached to portions of partly visible organs of hypopygium, anal protuberance longer than sixth segment, with two long curved terminal bristles.....*antiguensis*, p. 502.

The species in this group have two to four post-antennal bristles, and four rows of frontal bristles, the lower row consisting of two lateral, the second of four in a more or less straight row, the third in front of ocelli of four, and the vertical row of four.

PLASTOPHORA BEIRNE Brues.

Described from New Guinea. The peculiar proboscis and large size should distinguish this species should it ever turn up in this country, which is most unlikely.

PLASTOPHORA FORMICARUM Verrall.

Plate 39, fig. 6.

A very small species closely allied to *curriei*, but the outer bristles in the second row are closer to the pair in first row in *curriei*, the hind tibiæ are described as bare, and no mention is made in the description of the disparity in size of the scutellar bristles that exists in *curriei*. Not recorded from America.

PLASTOPHORA CRAWFORDI Coquillett.

Plate 39, figs. 5, 8.

Described from Texas. It attacks the ant *Solenopsis geminata*. Distinct from the above and next species in the position of the frontal bristles. The ovipositor of female is distinct from that of *curriei* and *spatulata*. Several specimens in collection, Dallas, Texas (Crawford).

PLASTOPHORA CURRIEI, new species.

Plate 39, figs. 4, 9, 10, 12.

This species is in general appearance very similar to *crawfordi*, but differs as stated in the table. The fringe of costa is rather longer in *curriei* than in *crawfordi*, the costa is in both species short of the

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middle of the wing and the first division is nearly twice as long as second, the hind tibiæ have a few delicate setulæ on the apical half of their postero-dorsal surfaces, and the anterior pair of scutellar bristles are much reduced in size. The male is similar to the female in everything, but the hypopygium is not exserted, the anal protuberance is long, bright yellow, and rather weakly bristled. The sixth abdominal segment is more elongate than in the next species and nearly bare, having no distinct bristles. Male similar to female, hypopygium as in table.

Four specimens Kaslo, British Columbia (R. P. Currie). "Hovering over ant galleries in stump." Standing as *Syneura cocciphila* Coquillett (det. Coquillett).

Type.—Cat. No. 14894, U.S.N.M.

PLASTOPHORA SPATULATA, new species.

Plate 39, fig. 7.

A specimen taken by Mr. J. C Crawford at Dallas, Texas, along with *crawfordi* Coquillett is in the shape of the ovipositor so different from that species as to leave no doubt that it is distinct from it. The ovipositor is very broad, horseshoe shaped, bilobed, and with a fine central process. The condition of the specimen is not very good, but so far as I can ascertain it resembles very closely *crawfordi* Coquillett, and only for the very striking ovipositor I should have refrained from describing it as new. The form of this organ should insure the recognition of the species at once.

One female, Dallas, Texas (J. C. Crawford).

Type.—Cat. No. 14895, U.S.N.M.

PLASTOPHORA ANTIGUENSIS, new species.

Plate 39, fig. 11.

Male.—Yellow; frontal bristles as in *crawfordi*, third antennal joint large, thickly pubescent, arista rather thick, as long as frons, pubescent, palpi yellow, moderately bristled, thorax thickly covered with short hairs, scutellum with four bristles, the anterior pair weak, abdomen yellow at base and at apex, intermediate joints browned, second segment elongate, sixth not much longer than fifth, with a circle of long, rather widely placed bristles on about the middle, hypopygium not exserted, several long hairs on the apices of the partly visible organs, anal protuberance long, 1½ times the length of sixth segment, yellow with two very long curved bristles at apex; legs stout, hind tibia with setulæ on postero-dorsal surface, those on apical half very distinct, wings as in *crawfordi;* halteres yellow.

Length, 1 mm.

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Six males, Antigua, West Indies. MS. label "attacking *Solenopsis geminata*."

The specimens are all males and what they would attack the ant for I do not clearly understand. I hardly think this can be the male of *crawfordi* and am describing it under this name in the belief that it is distinct from that species, the male of which is unknown. Standing with label in Coquillett's handwriting as *Phora cornuta* Bigot, an unrecognizable species.

Type.—Cat. No. 14896, U.S.N.M.

Genus SYNEURA Brues.

The only American species so far described of this genus is *coccophila* Coquillett. It was reared from larvæ infesting dead adults of *Icerya purchasi*, collected by C. H. T. Townsend in Mexico. There is quite a large series of this species in the collection. As it is the only American representative of the genus there should be no difficulty in recognizing it.

Genus METOPINA Macquart.

TABLE OF SPECIES.

Larger species, about 2 mm., wings clear, first division of costa twice as long as second..... *pachycondylæ*, p. 503.

Smaller species, at most 1 mm., wings grayish, first division of costa about three-fourths as long as second..... *fenyesi*, p. 503.

METOPINA PACHYCONDYLÆ Brues.

Distinct from the other two species in neuration. The fifth vein is not distinctly curved at its base, as in *galeata* Halliday and *fenyesi*. Its larger size and the clear wings and also the absence of the peculiar bend in the sixth vein are good characters for separating it from its congenors.

METOPINA FENYESI, new species.

Plate 39, fig. 13.

Very similar to *galeata* Halliday, but the wings are grayish, the fourth vein is nearer to the margin than to the fifth in the wing, the fifth vein leaves the third at nearer its apex and with a more rectangular bend than in *galeata*, and the hind metatarsus is not so much thickened. In color this species agrees closely with the European species. The head is black-brown, thorax brown, abdomen dark brown, yellowish at base, pleuræ, coxæ, and legs yellow, antennæ brown, palpi yellow, arista strongly pubescent, the proclinate bristles are large, being rather stronger than those in vertical row, and there are two scutellar bristles.

Length ½ mm.

One male Córdoba, Vera Cruz, Mexico (Dr. A. Fenyes), May 19, 1908.

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Type.—Cat. No. 14897, U.S.N.M.

I believe I am right in separating this from *galeata* Halliday, as it does not agree altogether with Becker's description of that species nor with those specimens of *galeata* I met with in Britain, but the specimen is not in good condition, and it is impossible to do more than point out the characters in which it does not agree with *galeata*.

Genus PULICIPHORA Dahl.

TABLE OF MALES.

1. Scutellum with two bristles.....2.
   Scutellum with four bristles.....3.
2. Costa to about three-fifths the wing length, palpi about as long as head height, with short weak bristles.....*nudipalpis*, p. 504.
   Costa to just beyond middle, palpi about as long as head height, with long delicate bristles.....*palposa*, p. 505.
3. Palpi large, much as in *palposa;* wings strongly infuscated.....*sylvatica*, p. 506.
   Palpi normal in size, wings not distinctly infuscated.....4.
4. Palpi brown.....*venata*, p. 506.
   Palpi clear yellow.....*borinquensis*, p. 506.

TABLE OF FEMALES.

1. Two pairs of proclinate, or semi-erect post-antennal bristles.....2.
   Only one pair of post-antennal bristles, thorax concave anteriorly and posteriorly, its sides rounded.....*nitida*, p. 508.
2. Hind metatarsi furnished with transverse rows of short bristles on ventral surface..3.
   Hind metatarsi not furnished with transverse rows of short bristles.
   occidentalis, p. 507.
3. Thorax broadest on anterior third, its lateral margins sinuate; head shorter than thorax.....*glacialis*, p. 507.
   Thorax broadest on posterior half, its sides more or less rounded; head longer than thorax.....*borinquensis*, p. 506.

PULICIPHORA NUDIPALPIS, new species.

Plate 41, fig. 4.

Male.—Brownish black, subshining; frons about twice as broad as long in center, with numerous short hairs besides the usual bristles, four nearly equal post-antennal bristles, the lateral bristles, usually on anterior lateral angle, at about one-fourth the width of frons from eye-margin, strongly incurved, antennæ brownish, normal size, arista distinctly longer than breadth of frons, pubescent, the facial marginal bristles not so strong as in *palposa*, palpi very long, nearly as long as height of head, not spatulate but broad, and nearly parallel sided, the bristles very short and weak; dorsum of thorax brownish, dull, pubescent, only two marginal scutellar bristles, the scutellum rather small, triangular, pleuræ brown, slightly shining; abdomen brownish black, segments subequal, with scattered hairs, those on lateral margins and posteriorly on last

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two segments longest, hypopygium yellowish brown, gray dusted, of moderate size, the anal protuberance distinct, yellowish, without any noticeable bristling, but with numerous short hairs; legs yellowish, the spurs on mid and hind tibiæ very minute; wings clear, costa to distinctly beyond middle, in one specimen to three-fifths the wing length, first costal division distinctly shorter than second, fringe microscopic, fourth vein hardly bent at either apex or base; halteres brown.

Length, 1–1¼ mm.

Type.—Cat. No. 14898, U.S.N.M.

Two males, Las Vegas, New Mexico, October 13–14, 1901 (H. S. Barber).

One male, of which the wing is figured, has the anal angle of wing very slightly produced; the other (the type) specimen has it more pronounced, but not so much so as in *palposa*.

PULICIPHORA PALPOSA, new species.

Plate 41, fig. 3.

Male.—Brown-black, subshining; frons shining, more than twice as broad as long; only two distinct post-antennal bristles, which are erect and divergent, this pair is probably the center pair of first row and the post-antennals are therefore really absent; a pair of inwardly directed bristles on lateral angles, the second and ocellar bristles normal, antennae brown-black, rather large, arista longer than breadth of frons, distinctly pubescent, a row of bristles on the face margin close to the eyes, of which the upper two are strongest and situated unusually high up close to the base of antennæ, palpi brown, about as long as height of head, spatulate, and with several (3–4) rather long, widely placed bristles at tip third; dorsum of thorax brownish black, slightly shining, pubescent, only two scutellar bristles, and those placed rather far forward, pleuræ dull brown; abdomen black, second segment slightly elongated, lateral margins of segments and posterior margins of last two with short hairs, hypopygium gray dusted, of moderate size, anal protuberance small but distinct, yellow, without strong hairs; legs piceous, mid and hind tibiæ with minute end spurs; wings infuscated, especially along veins, costa to beyond middle, first division distinctly shorter than second, third vein slightly dilated at tip, fourth vein curved at extreme base and slightly at extreme tip; halteres black-brown.

Length, 1½ mm.

Type.—Cat. No. 14899, U.S.N.M.

One male, Eureka, California, March 6, 1903 (H. S. Barber).

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PULICIPHORA SYLVATICA Brues.

Male.—Black; both pairs of post-antennal bristles present, unusually long, but slender, anterior lateral reclinate bristles present, second row strongly convex; palpi much enlarged and flattened, leaf-like, nearly as long as height of head and as broad as the eye, strongly bristly along the inferior edge near and at the apex, antennæ of moderate size, oval, arista pubescent; thorax subshining, four marginal scutellar bristles; abdomen smooth, faintly shining along the sutures, with a few sparse bristly hairs scattered over its surface, second segment slightly elongated, hypopygium not prominent, the superior lamella (anal protuberance?) more strongly hairy than usual; legs long and slender, quite thickly clothed with short, velvety pubescence, but without any setulæ; tibial spurs obsolete on all legs, wings large, strongly infuscated especially in front and along the viens; costal vein at a little beyond middle, cilia almost obsolete, first division of costa slightly but very appreciably shorter than second, fourth vein almost straight, halteres pure black.

Length, 1 mm.

Described from one male, Mount Constitution, Orcas Island, Juan County, Washington (July, 1908).[1] Brues mentions that the female should be a very striking form, as the male is unusually large. I can not see how this should be so, unless there is a mistake in the size given, as *venata*, the only species described prior to this in the male sex from America, is given as 1.3 mm.

PULICIPHORA VENATA Aldrich.

Male.—Brownish black; frontal bristles as in *sylvatica*, palpi brown, normal in size and bristling, the frons black, antennæ piceous, arista strongly pubescent, thorax brownish black, four scutellar bristles, abdomen black, hypopygium brown, with two black projecting clasp-ers below, anal protuberance brownish, strongly haired; legs yellow, femora darker, tibial spurs very minute, wings with costa to about the middle, first division shorter than second, fringe microscopic, fourth vein nearly straight and ending very near to the wing tip; halteres brownish black.

Length, 1.3 mm.

Described[2] as *Phora* from St. Vincent, West Indies. Type-specimen in collection.

PULICIPHORA BORINQUENSIS Wheeler.

Male.—Yellow; frons yellowish-brown, much broader than long, under pair of post-antennal bristles small, upper pair strong, the pair on anterior margin strongly incurved, second row nearly straight, antennæ of moderate size, yellow, arista not so distinctly pubescent

[1] Bull. Wis. Nat. Hist. Soc., vol. 7, 1909, p. 107. [2] Trans. Lond. Ent. Soc., pt. 3, 1896, p. 436.

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as in female, palpi clear yellow, large and moderately bristled; thorax yellow, pleuræ yellow, scutellum with four bristles; abdomen brown, segments subequal, hypopygium large, ventral processes protruding, anal protuberance long and distinctly hairy; legs yellow, tibial spurs minute; wings clear, veins brown, costa to beyond the middle, first division one-fourth shorter than second, fourth vein straight at base and running nearly straight to close to the wing tip; halteres brown. (First description of this sex.) Female entirely without wings and halteres; thorax shorter than head and about twice as broad as long, scutellum obsolete, three lateral marginal thoracic bristles, and four on the posterior margin the center pair being very minute; first abdominal segment short, second about one-third as long as length of abdomen, third, fourth, and fifth subequal, the latter with a crescent-like slit on the dorsum, its lateral edges near to anterior edge of segment and its center about one-third from apex of segment, legs stronger than in male, the hind metatarsi strong and with 5–6 transverse rows of short bristles on the ventral surface.

Length, 0.7–1.2 mm.

Represented in collection by a large number of specimens from Nassau, Bahama Islands (Bartsch and Barber). There are several specimens "from a decaying beetle," Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 27, 1906. (Barber and Schwarz), and one specimen same locality, April 18, 1906, taken outdoors, same collectors, that are identical with those from Nassau which were "feeding on a collection of shells." The original female specimens from which the species was described were found on a decaying beetle and the type-locality is Utudas, Porto Rico.[1]

PULICIPHORA OCCIDENTALIS Melander and Brues.

This species was described from specimens taken about the burrows of *Halictus* (*Hymenoptera*) at Woods Hole, Massachusetts.[2] I have not seen this species, which is known from the female only, and is unrepresented in the collection.

PULICIPHORA GLACIALIS, new species.

Plate 40, figs. 1, 2, 3.

Female.—Allied to *occidentalis* Melander and Brues, but larger and having a different arrangement of the bristles on the thorax. In the figure given by Melander and Brues of *occidentalis*[3] this species is represented as having one very long and strong bristle on the lateral margin of mesonotum near the anterior margin, and four posterior marginal bristles, the hind metatarsi are represented as having no transverse rows of short strong bristles as in the other two species. From *borinquensis* Wheeler *glacialis* may be distinguished by its much

[1] Bull. Amer. Mus. Nat. Hist., vol. 22, 1906, p. 269.
[2] Biol. Bull., vol. 5, 1903, p. 14.
[3] Idem, p. 18.

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longer thorax and comparatively shorter head. The general color of *glacialis* is brownish yellow with the abdomen darker, the legs are pale yellow and long, the hind femora being thicker than either of the other pairs; the antennæ are large, with very distinctly pubescent, almost plumose arista; the first abdominal segment is very short, the second about one-third the length of entire abdomen, the fourth slightly longer than the third, and all segments covered with short hairs which are only slightly longer on lateral and posterior margins, and noticeably so on lateral posterior angles of fourth and fifth segments; spurs on mid and hind tibiæ distinct though not large, hind metatarsi with six transverse rows of short strong bristles, which give the whole joint the appearance of being toothed when viewed from the side.

Length, fully 1 mm.

Two females, labeled "Active on the ice, Jan. 1874," Tyngsboro, Massachusetts. (F. Blanchard.)

PULICIPHORA NITIDA, new species.

Plate 40, fig. 4.

Female.—Head subquadrate, only slightly produced in front, shining yellow, with very minute bristles, and the short hairs extremely weak on disk, the two bristles on anterior edge of frons small, the usual pair in front of anterior ocellus indistinguishable, no trace of the posterior lateral pair, though this may be due to the slight falling in of head laterally, antennæ yellow, of good size, arista long and almost plumose, palpi large and strongly bristled; thorax shining yellow, concave anteriorly and posteriorly, broader than head, rounded laterally, narrower posteriorly, with two long lateral marginal bristles at beyond middle, and four nearly equidistant on posterior margin, pubescence on anterior lateral margins of thorax very thick, long, and pale in color; abdomen shining brown, oval in shape, first segment very short, second segment nearly one-third the length of entire abdomen, third, fourth, and fifth segments of equal length, the latter without the broad semicircular dorsal slit so noticeable in *occidentalis* and *borinquensis*, remaining segments membranous, all segments with very minute soft hairs; legs yellow, the hind pair strong, hind metatarsi with five transverse rows of short bristles, tibial end spurs microscopic.

Length, 0.75 mm.

One female, Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 19, 1906 (Schwarz and Barber).

Genus ECITOMYIA Brues.

Only a single species is described in this genus, namely, *wheeleri* Brues, from Texas. It is unrepresented in the collection. Occurs in nests of *Eciton cæcum* Latreille.

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Genus COMMOPTERA Brues.

The only species as yet described in this genus is *solenopsidis* Brues, from Texas. It occurs in nests of *Solenopsis geminata*.

Unrepresented in collection.

Genus ACONTISTOPTERA Brues.

In 1902, Brues[1] described an insect discovered in a nest of *Eciton opacithorax* Emery, at Austin, Texas, and placed it in a new genus, the principal characters of which are: Head broad, more than one and one-half times as wide as widest part of thorax, upper surface of head with two central macrochætæ, eight marginal ones on lateral and posterior edges, one over each eye, a bunch at front angles, and a regular series of closely placed ones along the front between the antennæ; thorax small, narrowed posteriorly, pleuræ visible from above, wings about as long as width of thorax, arcuate, of nearly equal width, with a few short bristles at base on external margin, at about middle these suddenly enlarge until at the tip they are more than twice as long as the wing, there are about 10 of these macrochætæ which are all strongly, thickly, and almost scaly pubescent. The only species described so far is *A. melanderi* Brues.

ACONTISTOPTERA MEXICANA, new species.

Plate 40, fig. 6; plate 41, fig. 1.

Female.—Differs from the description and figure of *melanderi* Brues in the much stronger bristling throughout. The bristles on posterior row are not so near the edge as shown by Brues, there are two on the sloping portion of the frons over the antennæ, there are three large bristles on either side of epistome that do not form part of the row mentioned in Brues's description of his species, there are several very strong curved macrochætæ on either lateral mouth edge, and the arista is plumose, the anterior pair of dorsal thoracic bristles are behind the second pair of lateral bristles, and much wider placed, the wings have no regularly placed small bristles on basal half, and the series begins to enlarge very suddenly at about one-third from base, the macrochætæ being of almost equal strength in the whole series of 10–12; in color and other respects as *melanderi*.

One female, Cordoba, Mexico, April 21, 1908, Dr. A. Fényes.

Type.—Cat. No. 14903, U.S.N.M.

[1] American Naturalist, vol. 34, p. 373.

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Genus XANIONOTUM Brues.

The single representative of this genus is *hystrix* Brues, from nests of *Eciton opacithorax* Emery, Austin, Texas.

Unrepresented in collection.

Genus CHONOCEPHALUS Wandolleck.

The previously described species of this genus are from the Far East. *C. dorsalis* Wandolleck,[1] being from Bismark Archipelago and *C. similis*[2] Brues, from Bombay, India. The male has wings which are strongly, but microscopically hairy, but the female has the wings, halteres, and ocelli absent. Brues in "Genera Insectorum" places this genus before *Syneura* Brues in his arrangement of genera, but it is certainly a more degenerate form than that genus and also several others which it precedes in his arrangement. I have no doubt that the species herewith described belongs to this genus, though it occurs so far from the localities already cited.

CHONOCEPHALUS BUCCATA, new species.

Plate 40, fig. 5.

Female.—Brownish yellow; head produced in front beyond antennæ, rounded anteriorly, about one-third broader at broadest part than long at longest part, yellowish anteriorly, darker toward vertex, the frontal bristles and ocelli absent, a few scattered, weak hairs present, two to three distinct bristles on anterior eye-margin behind antennæ, viewed laterally the frons projects almost as far beyond antennæ as diameter of third antennal joint, antennæ yellow, arista long and distinctly pubescent, eyes small, barely larger than third antennal joint, facets distinct, not much more than 20 in number, palpi small, distinctly bristled; dorsum of thorax extremely narrow, a mere band, distinctly concave anteriorly and posteriorly, about one-fourth as long at center as at side, abdomen oval, rather broader at beyond middle (egg-shaped), first segment the longest, fourth elongate but slightly shorter than first, numerous scattered hairs on all segments, only appreciably longer on posterior margins, and laterally on last two segments; legs yellow, covered with short hairs, spurs of mid and hind tibiæ very small and weak, hind metatarsi strong and as long as next three joints together.

Length, 0.50–0.75 mm.

Type.—Cat. No. 14902, U.S.N.M.

Five females, April 20, 1906, Cacao, Trece Aguas, Alta Vera Paz, Guatemala, (Schwarz and Barber).

One specimen shows two rather weak bristles on frons above the anterior eye margin, but I can not detect them in the other specimens.

[1] Zool. Jahrb., Abth. Syst., vol. 2, 1898, p. 428. [2] Ann. Mus. Nat. Hungary., vol. 3, 1905, p. 554.

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Genus ÆNIGMATIAS Meinert.

So far two species are described belonging to this genus, one of which is American, namely, *schwarzii* Coquillett. It may be distinguished from *blattoides* Meinert, by having only four free abdominal segments instead of five as in that species. Two specimens in collection.

Locality of type, Flagstaff, Arizona (H. S. Barber); second specimen, Bozeman, Montana (R. A. Cooley). This last specimen was taken in a greenhouse.

EXOTIC PHORIDÆ NEW TO SCIENCE IN COLLECTION.

DOHRNIPHORA NITIDA, new species.

Female.—Black; distinctly shining; frons very glossy, nearly as long as broad, center pair of bristles in first row distinctly lower on frons than outer pair, second row nearly straight or slightly concave, ocellar triangle raised slightly, antennæ clear yellow, arista at least twice as long as frons, distinctly pubescent, palpi yellow, rather long, and strongly bristled, proboscis thin, chitinized and projecting as far as end of palpi, yellow; thorax glossy black, paler along posterior margin, the dorsal hairs very numerous and long, one pair of dorsocentral bristles, pleuræ slightly brownish, scutellum slightly shining, very short, about one-fourth as long as broad and slightly produced posteriorly at center, with eight bristles, the second from each lateral edge being much the strongest; abdomen opaque, black, first segment very short, concave on posterior margin, centrally not one-sixth as long as second, second very long and broad, rather more than twice as long as third, produced laterally at middle, other segments decreasing in length and breadth, apex of abdomen with distinct hairs which are very strong on the apical third of the ventral surface; legs piceous, anterior pair and all tarsi paler, fore tibiæ with a row of about seven setulæ, the first one being at about the basal third, the second just before the middle, and the other five at nearly regular intervals on the apical two-fifths, mid tibial pair of setulæ very near base, the subapical one nearly at apex and very weak, the hairs on postero-dorsal surface almost setulose, hind tibiæ with only a single weak bristle at tip on dorsal surface besides the end spurs, the hairs on postero-dorsal surface very strong; wings grayish, costa to beyond middle, first division nearly twice as long as other two together, third about one-fourth as long as second, fringe short and very close, fourth vein leaving at before fork with a slight bend and ending recurved at slightly in front of wing tip; halteres black.

Length, 4 mm.

Locality.—Lorenzo Marques, Africa (C. W. Howard). Two specimens.

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A very distinct large species. Easily distinguished by the number of fore tibial and scutellar bristles from its congeners.

Type.—Cat. No. 14904, U.S.N.M.

HYPOCERA RECTANGULATA, new species.

Plate 35, fig. 9.

Female.—Yellow; frons yellow, post-antennal bristles of moderate size, frontal bristles large; front row situated close to the edge of frons, which is convex; second row convex, ocelli distinct; ocellar region darkened; antennæ yellow; third joint of moderate size, nearly round, arista yellow, pubescent, first and second joints swollen, distinct; palpi yellow, moderately bristled. Thorax with four indistinct brownish stripes, the lateral pair abbreviated in front and broadest; one pair of dorso-central bristles,[1] scutellum with four bristles, the anterior pair hardly more than coarse hairs; abdomen with the hind margins of the segments brownish-black; on the third to sixth segments this is carried forward in denticulate projections, leaving only small, yellow, triangular patches laterally and centrally; basal segment with a fringe of rather strong, closely placed bristles on the hind lateral margin, second segment with a lateral group of rather weaker bristles about the middle, legs entirely yellow except for the dorsal surface of hind tibia, front tibia with one spine at about the middle of the antero-dorsal surface, mid tibia with two strong spines at about the basal third (one antero-dorsal and one postero-dorsal) and one on about the apical third (antero-dorsal), the portion of dorsal surface above the basal pair covered with several transverse rows of closely placed short black bristles; hind tibia without spines, but the whole dorsal surface clothed with transverse rows of short black bristles; wing with costa to beyond the middle, costal vein distinctly, but not greatly, thickened, especially at the junction of the first vein, first section one-half the length of second, second thick vein bare, not so thick as costal vein, first thin vein leaving thick vein at right angles, running straight into the disk of the wing, then with a very abrupt turn continuing with a gentle curve to the wing tip, second thin vein nearly straight and running almost parallel with the first to near the wing tip, fourth thin vein distinct, tip of wing infuscated; halteres yellow, darkened at the tip.

Length, 5 mm.

Locality.—Tjibodas, Mount Gede, Java (altitude, 5,000 feet), Bryant and Palmer, collectors. One specimen.

Type.—Cat. No. 14905, U.S.N.M.

[1] There is in this specimen an extra bristle on the right side which I take to be abnormal.

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APHIOCHÆTA ORIENTATA, new species.

Plate 37, fig. 1.

Male and female.—Brownish-black, subshining; frons slightly shining, from lower post-antennal bristles to vertex about as long as breadth of frons, four large and nearly equally strong post-antennal bristles, the upper pair on slightly raised tubercles, as widely placed as one-third the width of frons, lower pair occupying about one-fifth of frons width, center pair of bristles in first row lower than post-antennal upper pair and about three times as far from eye margin as outer pair in first row, which are very slightly higher placed on frons than post-antennal upper pair, second row slightly convex, frontal suture indistinct except between post-antennals, where it forms a distinct oval cavity, ocellar tubercule distinct, antennæ large and somewhat oval, arista nearly twice as long as frons, more distinctly pubescent on terminal two-thirds, palpi yellow, larger than antennæ, with 5–6 long and very strong bristles and several smaller ones; thorax brownish black, distinctly yellowish brown on anterior lateral margins, humeri yellowish, pleuræ brownish black, the mesopleuræ with numerous distinct hairs, three of which on the posterior margin are distinctly longer than the others, scutellum with four strong bristles; abdomen brownish at base, toward apex and especially the fourth segment yellowish, some scattered long hairs on lateral and posterior margins of segments; legs yellow, posterior four coxæ, bases of fore femora, mid femora except apices, and dorsal and ventral surfaces of hind femora brownish, all tibiæ with distinct setulæ on postero-dorsal surfaces and mid tibiæ with a row on basal half of antero-dorsal surface, those on hind tibiæ (9–10) beginning at about basal third, rather widely placed and nearly as long as the diameter of tibiæ; wings slightly infuscated, costa to distinctly beyond middle, first division barely two-thirds as long as second, third about one-fifth as long as second, fringe very delicate and closely placed, as long as from base of third vein to costa, fourth vein leaving third at distinctly in front of fork with a gradual curve and ending with a distinct upward sweep at much in front of wing tip, fifth vein not much bent and ending nearer to wing tip than fourth; halteres yellow.

Length, 2½–3½ mm.

Two specimens, Tjibodas, Mount Gede, Java (Bryant and Palmer). Easily known by the peculiar black surface of the hind tibiæ, which is bare of hairs between the dorsal ridge and the setulæ, as well as the very short first costal division.

The male has the first costal division nearly as long as the second, the anterior pair of scutellar bristles much reduced, and the anal

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protuberance short, stout, and of a clear yellow color. Otherwise as the female.

Type.—Cat. No. 14906, U.S.N.M.

APHIOCHÆTA TASMANIENSIS, new species.

Male and female.—Black-brown, shining; frons black, nearly as long as broad, with numerous short hairs besides the usual bristles, lower post-antennal bristles nearly as large as upper pair, and a little closer placed, the upper pair occupying one-fifth of the width of frons, center pair in first row nearer center of frons than outer pair but hardly lower, the upper pair in transverse line with upper post-antennals; thorax with the usual short dorsal hairs, scutellum with two strong marginal bristles and four hairs on the posterior margin between them, mesopleuræ bare; abdomen dull black-brown, second segment elongated in both sexes, sixth in male slightly elongated and with a conspicuous pale posterior margin, sixth in female much elongated, male hypopygium and anal protuberance inconspicuous; legs yellow, posterior femora darkened at apex, mid tibiæ with two rows of setulæ, those on antero-dorsal surface minute, hind tibiæ with a single strong row; wings clear or yellowish, costa short of middle, first division two and one-half times as long as second, third rather more than half as long as second, fringe long, but delicate and rather widely placed, fourth vein curved at base and running straight to near wing tip; halteres yellow.

Length, 1½–2 mm.

A large number of specimens of both sexes from Tasmania (Arthur M. Lea).

Was standing with label *Phora omnivora* Hudson ?. I am not surprised at the ? being on the label, as it is absolutely impossible for any one to tell just exactly what sort of Phorid Hudson had before him when he wrote his book.[1] Kertesz includes Hudson's species in *Phora*, but I infer from the caricature given by Hudson that it is an *Aphiochæta*. However, it is quite unrecognizable. It is obvious from Hudson's remarks that he had more than one species before him, and there is no reason to suppose, considering the remoteness of Tasmania from New Zealand, that this was one of them.

Type.—Cat. No. 14907, U.S.N.M.

APHIOCHÆTA SETARIA, new species.

Female.—Yellow, subshining; frons dull yellow, darker toward vertex, covered with very short black hairs, and with the usual bristles, both pairs of post-antennal bristles present, the lower pair three-fourths as large as upper pair, and not much closer placed, the upper pair separated by one-fourth the breadth of frons, center pair of bristles in first row distinctly lower than outer pair, in transverse

[1] Man. New Zealand Ent., 1892, p. 62.

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line with upper post-antennals, and distinctly nearer middle of frons than outer pair, center pair in second row distinctly in front of outer pair in same row and about one-fourth the distance from ocellar triangle to upper post-antennals, antennæ dusky yellow, arista pubescent, distinctly longer than frons, palpi large, pale yellow, moderately bristled; thorax yellow, very slightly shining, thickly covered with short hairs, those of the posterior margin immediately in front of scutellum longer, four equally long scutellar bristles, mesopleuræ with numerous short bristles; abdomen brownish black, segments subequal, fifth and sixth with long hair-like bristles laterally and posteriorly, ovipositor yellow, with long distinct hair-like bristles; legs yellow, apices of hind femora distinctly darkened, basal third of hind femora with long curled hairs on ventral surface, mid and hind tibial setulæ distinct, the terminal one on the latter almost spur-like; wings clear, costa to middle, first division one and one-half times as long as second, third about one-fourth as long as second, fringe barely longer than diameter of costal vein, close and delicate, fourth vein leaving at fork with a slight downward sweep and running with an even arcuation to distinctly in front of wing tip; halteres yellow.

Length, 2¼ mm.

One female, Hawaii, Maui (Koebele).

Type.—Cat. No. 14908, U.S.N.M.

APHIOCHÆTA VARIATA, new species.

Male and female.—Yellow; frons at least as long as broad, yellow, with the ocellar region brownish, both pairs of post-antennal bristles strong and of nearly equal size in male, both pairs in female much reduced but of equal size, center pair of bristles in first row very slightly below the upper post-antennal pair transversely, and about equidistant from them and the outer bristle in first row, which latter is considerably higher on frons and near to eye-margin, antennæ yellow, browned at tip, more distinctly darkened in male, arista brown, bare, about one-third longer than frons, palpi pale yellow, normal; thorax dull yellow in female, brownish in male, mesopleuræ bare, scutellum with two strong bristles and two microscopic hairs anterior to them in male, four nearly equal, strong bristles in female, in color the scutellum is whitish yellow almost all over in female, in male the posterior margin broadly yellowish; abdomen of male black, all segments very distinctly, posteriorly whitish yellow bordered, the sixth more broadly so, second segment elongate but not greatly so, hypopygium yellow, anal protuberance inconspicuous, yellow, female abdomen brownish except first segment and posterior margins of remainder, which are yellow, ovipositor yellow, no noticeable hairs on abdomen in either sex; legs yellow, apices of hind femora distinctly darkened, hind tibiæ slightly darker than other tibiæ, mid tibial setulæ indistinct, those on hind tibiæ distinct on apical two-thirds, two distinct end spurs on

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ventral surface in both sexes on hind tibiæ; wings clear, costa to about two-fifths the wing length in female, about one-third of wing length in male, first division more than twice as long as other two together, fork of third vein indistinct, the branches very close especially in female and nearly fused; fringe close and short, barely longer than diameter of costal vein, fourth vein very slightly up-curved at apex, ending distinctly in front of wing tip; halteres yellow.

Length, 1–1½ mm.

Two specimens, Manila, Philippine Islands (W. A. Stanton).

Labelled "*Phora nigriceps*, Lw." A manuscript label states that there is "a large series in alcohol," but I have been unable to locate them. Allied to *fasciata* Fallen, but distinct in having only one row of posterior tibial setulæ and four scutellar bristles in female. It differs from *rufa* Wood in color and in having a longer arista.

Type.—Cat. No. 14909, U.S.N.M.

PARASYNEURA, new genus.

Frons broad, with four proclinate bristles and three rows of four frontal bristles, ocelli distinct, ocellar triangle raised, frontal suture distinct, antennæ round, arista long, dorsal; thorax as in *Aphiochæta*, abdomen in female with the first and second segments much elongated, ovipositor not much exserted, fleshy; wings with costa very long, the third vein unforked; mediastinal vein present.

Type of the genus.—*Parasyneura rotundipennis*, new species.

PARASYNEURA ROTUNDIPENNIS, new species.

Plate 39, figs. 1–3.

Female.—Yellow; frons broader than long, the lower pair of postantennal bristles much smaller than the upper; antennæ brown, of moderate size, arista distinctly pubescent, nearly twice as long as frons, palpi clear yellow, strongly bristled, thorax with two dorsocentral bristles, scutellum with two bristles, mesopleura bare; first and second abdominal segments of about equal length, occupying two-thirds of length of abdomen, yellow, the second with what appears to be an orifice set in a depression at base, third segment black, opaque, a small rounded flap protruding from under the apex of second segment of same color, fourth segment yellow, fifth and sixth infuscated, the three of equal length, ovipositor as in *Aphiochæta*, lateral venter visible from above from end of first segment to end of third, membranous; wings of moderate length rounded at tip, costa to about three-fourths the wing length, third vein unforked, first division of costa about one-half the length of second, fringe fine and sparse, fourth vein nearly obsolete, very short and traceable to where it ends much in front of tip of wing, fifth vein widely separated from fourth, distinct at base, but obsolete at

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wing margin, sixth and seventh distinct; legs yellow, spurs of posterior pairs of tibia well developed, hind tibia with a row of short serial setulæ on the postero-dorsal surface, hind metatarsus with about 10 transverse rows of short thickly placed bristles on ventral surface, halteres yellow.

(Fourth vein drawn distinct in plate to show its course.)

Length, 1.75 mm.

Locality.—Tjibodas, Mount Gede, Java (Bryant and Palmer), 5,000 feet. One specimen.

Type.—Cat. No. 14910, U.S.N.M.

Much as I regret the creation of genera for the reception of single species, there seems no other way out of it, as the insect does not fall within either *Plastophora* or *Syneura*, as defined by Brues, differing in several essential characters from both of those genera.

ADDENDA.

APHIOCHÆTA FENESTRATA, new species.

Female.—Black, subshining; frons about one-fourth longer than broad, upper post-antennal bristles close together, of moderate size, under pair small, center pair of bristles in first row much nearer to center of frons than outer pair and about equidistant from those and upper post-antennals; antennæ yellowish, third joint round, arista pale, as long as frons, pubescent, palpi yellow, of moderate size, with 4–5 bristles; mesonotum thickly covered with short hairs, about 6 bristles in a transverse row on posterior margin, mesopleuræ with numerous bristles of irregular lengths, scutellum with four bristles; abdomen black, opaque, nearly bare; legs yellowish, hind pair darker, fore tarsi thickened, thinner than tibiæ and longer by about length of apical joint, hind femora and tibiæ broad and strong, the hind tibial setulæ short and only noticeable on apical half; wings grayish, neuration as in *divergens*, a distinct bristle on base of third vein; halteres black.

Length, 1 mm.

Type.—Cat. No. 15261, U.S.N.M.

Locality.—United States National Museum, Washington, District of Columbia, on window, May 28, 1912 (J. R. Malloch).

Very close to *divergens*, but the above description should serve to separate them. Owing to the presence of four scutellar bristles *fenestrata* will run down to *arcuata* in the table of species given in Group D on page 452.

APHIOCHÆTA SCHWARZI, new species.

Female.—Black; frons one-third longer than broad, slightly shining, punctured, and with the surface covered with numerous short hairs, two pairs of convergent post-antennal bristles, the under pair about

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two-thirds as large as the upper, upper pair occupying one-third the breadth of frons, the under about one-fourth, center pair of first row bristles much below the outer pair, in transverse line with upper post-antennals and about midway between them and the eye margin, second row about one-sixth the distance from the ocelli to upper post-antennal bristles, antennæ brownish yellow, rather small, arista about one-fourth longer than frons, very shortly pubescent, palpi yellow, of normal size and numerously bristled; mesonotum slightly shining, the surface with numerous short hairs, two bristles on posterior margin, pleuræ black-brown, distinctly shining, bare, scutellum with two bristles and two very weak hairs anterior to them; abdomen opaque black, segments with a few short scattered hairs; legs yellow, hind pairs, except apices of coxæ, trochanters, and bases of femora brown, setulæ as in *furtiva*, but those on hind tibiæ stronger; wings narrow, slightly browned, costa to distinctly beyond middle, first division as long as next two, third nearly half as long as second, fringe nearly as long as fork of third vein, close and fine, but longer than in *furtiva*, fourth vein rounded at base, not reaching to third, recurved at apex and ending at distinctly in front of wing tip; halteres black.

Length, 1½ mm.

Type.—Cat. No. 15266, U.S.N.M.

Locality.—One female, Plummers Island, Maryland, August 3, 1912 (J. R. Malloch).

In the table given for Group D this species runs down to *furtiva* Aldrich, from which it may be separated by the position of the frontal bristles, the narrow wings, the longer third costal division and the longer fringe.

Named in honor of Mr. E. A. Schwarz, the president of the Washington Biologists Field Club, who has done so much to make Plummers Island one of the best known entomological localities in America.

Genus PHALACROTOPHORA Enderlein.

This genus was created by Enderlein for the reception of a single species, *bruesiana* Enderlein,[1] and the only character given for its separation from *Aphiochæta* is "frons with only marginal bristles." No mention is made of how many rows of bristles there are on the frons, and without a clear understanding of this it is impossible to say whether *epeiræ* Brues and *longifrons* Brues belong to the genus or not. Brues has indicated that they do belong here,[2] but if that should be the case then some other species of American *Aphiochætæ*, including *atlantica* Brues and *picta* Lehm, should also be considered as congeneric. The frontal bristles in the first row are subject to very considerable variation in the matter of position, and this is the more pronounced when the frons is elongated. It is the rule that

[1] Stett. Ent. Zeit., 1912, p. 21.

[2] Psyche, vol. 19, 1912, No. 4, p. 135.

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when the frons is much broader than long the first row of bristles is transverse or almost so, and when the frons is longer than broad the center pair of bristles in this row is much below the outer pair, in many cases directly or almost directly below the outer pair. This is noticeably so in the species above cited, but there are among the other species in *Aphiochæta* all the possible variations between these two extremes, so that it would be impossible to place some species in either *Phalacrotophora* or *Aphiochæta* if the situation of these bristles is to be taken as the line of demarcation between the genera. I am not in a position to say definitely whether Enderlein had a species which is entitled to rank as of a distinct genus from *Aphiochæta* because of his rather unsatisfactory description, but if *bruesiana* agrees with *epeiræ* in the bristling of the frons then I should be inclined to consider it as an *Aphiochæta*. The characters I have used for the separation of the groups in this paper are much more reliable and at least to my mind more satisfactory than the single one cited by Enderlein for *Phalacrotophora*.

PULICIPHORA VIRGINIENSIS, new species.

Male.—Brownish yellow, subshining; frons opaque brown, about one-fourth broader than long, four weak, subequal post-antennal bristles present, the lower pair low down between the antennæ and separated by almost as wide a space as the upper pair, center pair in first row almost in transverse line with the upper post-antennals and nearer to center of frons than outer pair in same row, which are much higher placed on frons; besides the normal bristles there are numerous short hairs on the surface, antennæ yellowish, third joint large, slightly pointed, arista almost apical, distinctly pubescent, pale, slightly longer than breadth of frons, palpi pale, rather spatulate, with 3–4 long, slender bristles on lower surface; mesonotum with two long bristles in front of scutellum, pleuræ yellowish, scutellum with two long posterior bristles and two very weak anterior hairs; abdomen opaque brown with a few weak lateral hairs, hypopygium protruding, yellowish, shining, organ on right side produced into an acute point, anal protuberance small, yellowish, with a few surface hairs; legs and coxæ almost entirely yellow, only the tarsi darkened, mid tibial spur minute, hind tibial spur large and distinct; wings grayish, costa to about three-fifths the wing length, distinctly thickened on middle, first division two-thirds as long as second, fringe very short, fourth vein straight, separated from third vein by a clear tenth of its length, parallel with fifth and ending at very near to wing tip; halteres dark brown.

Length, 0.75 mm.

Type.—Cat. No. 15262, U.S.N.M.

Locality.—Rosslyn, Virginia, September 22, 1912 (Knab and Malloch).

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This species comes next to *palposa* in the table of males given for the genus and may be separated from it by the smaller size, different bristling of frons, paler color and straight fourth vein.

CATALOGUE OF AMERICAN PHORIDÆ, WITH LIST OF STATES THEY HAVE BEEN RECORDED FROM.

[[a] Types in United States National Museum; [b] Represented in United States National Museum; [c] European species introduced in present paper.]

Trupheoneura Malloch. Journ. Nat. Hist. Soc. Glasgow, vol. 1, 1908, p. 27 (*Phora* of authors, part; not Latreille).

occidentalis Brues. Journ. N. Y. Ent. Soc., vol. 16, 1908, p. 200, Washington, Idaho.

[a] *fratercula* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 341, Wyoming, District of Columbia, New Hampshire.

[b] *pachyneura* Loew. Dipt. Sept. Amer., Cent., 7, 1866, species 97, Alaska, Washington, Idaho, Wisconsin, Quebec, Canada.

[a] *vitrinervis* Malloch. This paper, p. 419, New Hampshire.

[b] *microcephala* Loew. Dipt. Sept. Amer., Cent., 7, 1866, species 96, New Hampshire.

[a] *subfusca* Malloch. This paper, p. 422, Massachusetts.

[a] *suspecta* Malloch. This paper, p. 420, North Dakota.

varipes Malloch. This paper, p. 419, Kansas.

Chætoneurophora, new name. This paper, p. 422. (*Phora* of authors, part; not Latreille).

variabilis Brues. Journ. N. Y. Ent. Soc., vol. 16, 1908, p. 199, Washington, Colorado.

curvinervis Becker. Abh. zool.-bot. Ges. Wien, 1901, p. 33, Washington, New Hampshire.

[b] *thoracica* Meigen. Klass., vol. 1, 1804, p. 313, species 2, New Hampshire.

[a] *olympiæ* Aldrich (apud Brues). Trans. Amer. Ent. Soc., vol. 29, 1903, p. 344, Washington, New York.

[a] *luggeri* Aldrich. Can. Ent., vol. 24, 1892, p. 125, Maryland, New Hampshire, Kansas, Massachusetts, Minnesota, Pennsylvania.

[a] *spinipes* Coquillett. Can. Ent., vol. 27, 1895, p. 424, Connecticut, Idaho, Ohio, Washington.

Paraspiniphora, new name. This paper, p. 425. (*Phora* of authors, part; not Latreille).

[a] *scutellata* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 344, Grenada, West Indies.

[c] *spinosissima* Strobl. "Phora Oest." Wien Ent. Zeit., vol. 11, 1892, Maryland.

[a] *spinulosa* Malloch. This paper, p. 429, New York.

[b] *bergenstammi* Mik. Verh. zool.-bot. Ges., vol. 14, 1864, p. 793, New York, Maryland.

[a] *trispinosa* Malloch. This paper, p. 427, British Columbia.

[a] *slossonæ* Malloch. This paper, p. 428, New Hampshire, New York.

[a] *multiserata* Aldrich (apud Brues). Trans. Amer. Ent. Soc., vol. 29, 1903, p. 345, Kansas, New York.

Dohrniphora Dahl. Sitz. Ges. nat. Freunde, 1898, p. 188. (*Phora* of authors, part; not Latreille).

[b] *concinna* Meigen. Syst. Beschr., vol. 6, 1830, p. 221, species 28, South Dakota, California, Massachusetts, New York, New Jersey, Pennsylvania.

crassicornis Meigen. Syst. Beschr., vol. 6, 1830, p. 220, species 26, U. S. A. (Brues, Gen. Ins.).

[a] *knabi* Malloch. This paper, p. 431, Panama.

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Dohrniphora Dahl—Continued.

[b] *incisuralis* Loew. Dipt. Sept. Amer., Cent., 7, 1866, species 98, Florida, Louisiana, Virginia.

[a] *venusta* Coquillett. Can. Ent., vol 17, 1895, p. 107, Massachusetts, Florida, Texas, District of Columbia, Grenada, Trinidad, West Indies, Panama.

Hypocera Lioy. Atti. Istit. Veneto., vol. 10, 1864, p. 78.

[a] *johnsoni* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 352, New Jersey, Ontario, Canada, Nicaragua.

[a] *grenadensis* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 356, Grenada, West Indies.

[b] *flavimana* Meigen. Syst. Beschr., vol: 6, 1830, p. 213, species 5, New Hampshire, District of Columbia, Massachusetts, Maine, Rhode Island.

?[b] *clavata* Loew. Dipt. Sept. Amer., Cent., 7, 1866, species 95, District of Columbia, Massachusetts, Kansas.

[a] *ehrmanni* Aldrich (apud Brues). Trans. Amer. Ent. Soc., vol. 29, 1903, p. 353, Pennsylvania, Maryland.

[a] *convergens* Malloch. This paper, p. 435, Panama.

Conicera Meigen. Syst. Beschr., vol. 6, 1830, p. 226.

[a] *aldrichi* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 279, Idaho.

[b] *atra* Meigen. Syst. Beschr., vol. 6, 1830, p. 226, species 1, District of Columbia, Massachusetts, New Jersey, New York, Michigan, Canada.

[a] *neotropica* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 380, as var. of *atra*, Grenada, West Indies.

Phora Latreille. Hist. Nat. Crust. et Ins., vol. 3, 1802, p. 464 (= *Trineura* Meigen, Ill. Mag. Ins., vol. 2, 1803, p. 276, 88).

[a] *occidentata* Malloch. This paper, p. 438, Alaska, New Hampshire, California.

[b] *aterrima* Fabricius. Ent. Syst., vol. 4, 1794, p. 334, species 93, Massachusetts, Pennsylvania, Kansas, South Dakota, Michigan, New York, Texas, Illinois.

[b] *velutina* Meigen. Syst. Beschr., 1830, p. 224, species 38, California, Idaho, Kansas, Massachusetts, Michigan, Alaska.

[a] *montana* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 377, New Mexico, Kansas.

Pseudohypocera Malloch. This paper, p. 439.

[a] *clypeata* Malloch. This paper, p. 440, Mexico.

Apocephalus Coquillett. Proc. Ent. Soc. Wash., vol. 4, 1901, p. 501.

[a] *wheeleri* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 373, Wisconsin.

[a] *spinicosta* Malloch. This paper, p. 442, Texas.

[a] *coquilletti* Malloch. This paper, p. 443, Pennsylvania, Tennessee, Maryland.

[a] *pergandei* Coquillett. Proc. Ent. Soc. Wash., vol. 4, 1901, p. 501, Maryland, District of Columbia.

[a] *similis* Malloch. This paper, p. 444, New Mexico.

[a] *aridus* Malloch. This paper, p. 444, Mexico.

Beckerina Malloch. Ann. Mag. Scot. Nat. Hist., 1910, p. 90.

[a] *orphnephiloides* Malloch. This paper, p. 441, Maryland.

Aphiochaeta Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 337.

[a] *conglomerata* Malloch. This paper, p. 445, British Columbia.

[a] *magnipalpis* Aldrich. Trans. Ent. Soc. Lond., 1896, p. 438, St. Vincent, Grenada, West Indies.

[c] *projecta* Becker. Monog. Phoridæ, Abh. zool-bot. Ges. Wien.,vol. 56, 1901, New Hampshire, West Indies.

[a] *californiensis* Malloch. This paper, p. 447, California.

[a] *nedæ* Malloch. This paper, p. 448, Mexico.

[b] *longifrons* Brues. Bull. Wis. Nat. Hist. Soc., vol. 4, 1906, p. 100, Wisconsin, Maryland, New York.

[b] *epeiræ* Brues. Psyche, vol. 9, 1902, No. 314, p. 351, Texas, Louisiana, Florida, New Jersey, Pennsylvania, Maryland, New Hampshire.

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Aphiochaeta Brues—Continued.

halictorum. Melander and Brues, Biol. Bull., vol. 14, 1903, Massachusetts.
[a] *barberi* Malloch. This paper, p. 450, New Mexico.
[b] *picta* Lehm. Indic. schol. Hamburg, 1822, No. 43, New Hampshire, Maryland, Wisconsin, New Jersey, St. Vincent, West Indies.
[a] *subpicta* Malloch. This paper, p. 452, Florida.
[a] *marginalis* Malloch. This paper, p. 457, Missouri.
[a] *submarginalis* Malloch. This paper, p. 458, Maryland.
[b] *juli* Brues. Journ. N. Y. Ent. Soc., vol. 16, 1908, p. 201, Wisconsin, Maryland.
[a] *perdita* Malloch. This paper, p. 459, Maryland.
[a] *arcuata* Malloch. This paper, p. 460, Maryland.
[a] *fenestrata* Malloch. This paper, p. 517, District of Columbia.
[b] *nigriceps* Loew. Dipt. Sept. Amer., Cent., 7, 1866, species 99, New Hampshire, Missouri, Massachusetts, Illinois, Tennessee, Texas, Rhode Island.
[a] *winnemana* Malloch. This paper, p. 461, Maryland.
[a] *aletiæ* Comstock. Cotton Insects, 1879, p. 208–211, Alabama, New York.
[a] *fisheri* Malloch. This paper, p. 463, Maryland.
[a] *inaequalis* Malloch. This paper, p. 464, District of Columbia.
[a] *macrochæta* Malloch. This paper, p. 464, Porto Rico.
[a] *spinifemorata* Malloch. This paper, p. 465, Jamaica, West Indies.
[c] *ruficornis* Meigen. Syst. Beschr., vol. 6, 1830, p. 218, species 21, New Hampshire, Maryland, New York, New Jersey.
[a] *aurea* Aldrich. Trans. Ent. Soc. Lond., 1896, p. 437, Grenada, West Indies.
[b] *scalaris* Loew. Dipt. Sept. Amer., Cent., 7, 1866, species 100, Tobago, West Indies, Brazil, Cuba, Florida, Mexico, Pennsylvania.
[a] var. *cordobensis* Malloch. This paper, p. 467, Mexico.
[a] *sublutea* Malloch. This paper, p. 468, New Hampshire, New Jersey.
[a] *carlynensis* Malloch. This paper, p. 468, Virginia.
[b] *flava* Fallen. Dipt. Suec. Phytom., p. 7, species 8 (Trineura) 1823.
[a] *obscura* Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 362, St. Vincent, West Indies.
[a] *evarthæ* Malloch. This paper, p. 472, Michigan.
[a] *straminea* Malloch. This paper, p. 472, New York.
[a] *fungorum* Malloch. This paper, p. 473, Maryland.
[a] *longipennis* Malloch. This paper, p. 473, Louisiana.
[a] *cayuga* Malloch. This paper, p. 474, New York.
[a] *straminipes* Malloch. This paper, p. 474, New York.
[a] *johannseni* Malloch. This paper, p. 474, New York.
[a] *brunnipes* Malloch. This paper, p. 475, Maryland.
[a] *iroquoiana* Malloch. This paper, p. 476, New York, Michigan.
[a] *ursina* Malloch. This paper, p. 476, British Columbia.
rostrata Melander and Brues. Biol. Bull., vol. 5, 1903, p. 15, Massachusetts.
cata Melander and Brues. Biol. Bull., vol. 5, 1903, p. 16.
[a] *proboscidea* Malloch. This paper, p. 477, Maryland.
[a] *arizonensis* Malloch. This paper, p. 478, Arizona.
[a] *monticola* Malloch. This paper, p 479, British Columbia.
[a] *franconiensis* Malloch. This paper, p. 479, New Hampshire.
[a] *dubitata* Malloch. This paper, p. 480, British Columbia.
[a] *divergens* Malloch. This paper, p. 480, Maryland, Arizona.
[a] *atomella* Malloch. This paper, p. 481, Alaska, British Columbia. (?)
[a] *subatomella* Malloch. This paper, p. 481, New Zealand.
[c] *ciliata* Zetterstedt. Dipt. Scand., vol. 7, 1848, p. 2872, series 22, New York, Maryland.
[a] *retardata* Malloch. This paper, p. 482, New Mexico.
[a] *approximata* Malloch. This paper, p. 483, Illinois, Maryland, Connecticut.

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Aphiochaeta Brues—Continued.

[a] *vulgata* Malloch. This paper, p. 483, Maine, Missouri, Massachusetts, New Hampshire.

[a] *difficilis* Malloch. This paper, p. 484, Massachusetts, North Carolina, New York.

[a] *anomala* Malloch. This paper, p. 484, New Hampshire.

[a] *subobscurata* Malloch. This paper, p. 485, New Hampshire

[a] *fungicola* Coquillett. Can. Ent., vol. 27, 1895, p. 106, New Mexico.

[a] *furtiva* Aldrich. Trans. Ent. Soc., Lond., p. 436, St. Vincent, West Indies.

[a] *schwarzi* Malloch. This paper, p. 517, Maryland.

[a] *conspicualis* Malloch. This paper, p. 487, California.

[a] *bicolorata* Malloch. This paper, p. 486, Maryland.

[a] *inornata* Malloch. This paper, p. 488, New York.

[a] *borealis* Malloch. This paper, p. 488, British Columbia.

[a] *rusticata* Malloch. This paper, p. 489, Oregon.

[a] *perplexa* Malloch. This paper, p. 489, British Columbia.

[a] *infumata* Malloch. This paper, p. 490, California.

[a] *chætoneura* Malloch. This paper, p. 490, Georgia, Ohio.

[b] *cavernicola* Brues. Bull. Wis. Nat. Hist. Soc., vol. 4, 1906, p. 101, Indiana, Kentucky.

[a] *peregrina* Malloch. This paper, p. 492.

[a] *dyari* Malloch. This paper, p. 493, British Columbia.

[a] *flavinervis* Malloch. This paper, p. 493, Maryland.

[b] *minor* Zetterstedt. Dipt. Scand., vol. 7, 1848, p. 2864, species 13, South Dakota, Florida, New Hampshire.

[b] *rufipes* Meigen. Klass., vol. 1, 1804, p. 313, species 3, District of Columbia, Massachusetts, Maryland, California, British Columbia, Toronto, Alberta, Idaho, Pennsylvania, New York, Illinois, Michigan.

[b] *pulicaria* Fallen. Dipt. Suec., vol. 7, 1823, p. 6, Maryland, Massachusetts, Louisiana, South Dakota, Idaho, California.

[a] *setacea* Aldrich. Can. Ent., vol. 24, 1892, p. 144, Brookings, South Dakota, District of Columbia.

[b] *albidohalteris* Felt. 12th Rep. N. Y. Entom., 1897, p. 228, New Jersey, Ohio, District of Columbia.

smithi Brues. Bull. Wis. Nat. Soc., vol. 7, 1909, p. 107, New Jersey.

[a] *fuscopedunculata* Malloch. This paper, p. 498.

[b] *agarici* Lintner. 10th Rep. N. Y. State Entom., 1895, p. 399.

[b] *pygmæa* Zetterstedt. Dipt. Scand., vol. 7, 1848, p. 2860, Idaho, California, Texas.

Melaloncha Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 374.

pulchella Brues. Trans. Amer. Ent. Soc., vol. 29, 1903, p. 375, Bolivia, South America.

Gymnophora Macquart. Suite à Buffon, vol. 2, 1835, p. 631.

[b] *arcuata* Meigen. Syst. Beschr., vol. 6, 1830, p. 222, species 33.

Plastophora Brues. Ann. Mus. Nat. Hungary, vol. 3, 1905, p. 551.

[a] *crawfordi* Coquillett. Can. Ent., vol. 39, 1907, p. 208, Texas.

[a] *curriei* Malloch. This paper, p. 501, British Columbia.

[a] *spatulata* Malloch. This paper, p. 502, Texas.

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[a] *fenyesi* Malloch. This paper, p. 503, Mexico.

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[a] *nudipalpis* Malloch. This paper, p. 504, New Mexico.

[a] *palposa* Malloch. This paper, p. 505, California.

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[a] *venata* Aldrich. Trans. Lond. Ent. Soc., vol. 3, 1896, p. 436, St. Vincent, West Indies.
[b] *boringuensis* Wheeler. Bull. Amer. Mus. Nat. Hist., vol. 22, 1906, p. 269, Porto Rico.
[a] *glacialis* Malloch. This paper, p. 507, Massachusetts.
occidentalis Melander and Brues. Biol. Bull., vol. 5, 1903, Massachusetts.
[a] *nitida* Malloch. This paper, p. 508, Guatemala.
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[a] *buccata* Malloch. This paper, p. 510, Guatemala.
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wheeleri Brues. Amer. Nat., vol. 35, 1901, p. 347, Texas.
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solenopsidis Brues. Amer. Nat., vol. 35, 1901, p. 344, Texas.
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[a] *schwarzi* Coquillett. Can. Ent., vol. 35, 1903, p. 21.

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rectangulata Malloch. This paper, p. 512, Java.

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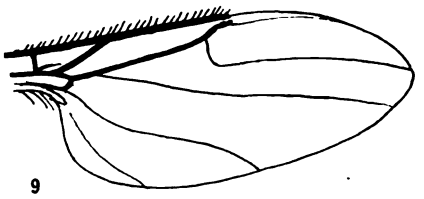

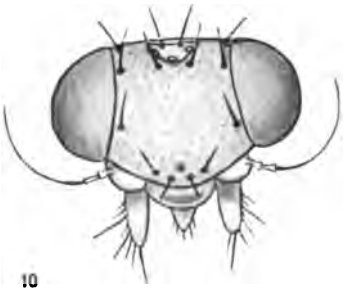

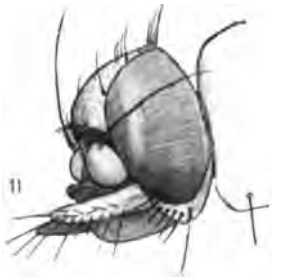

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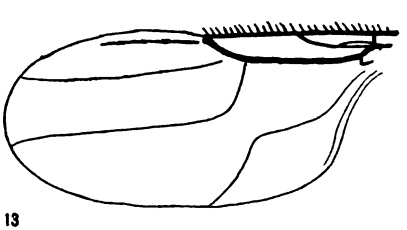
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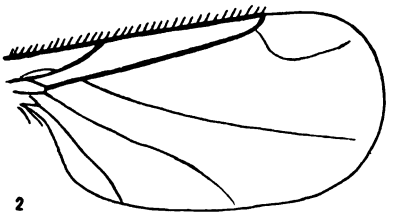
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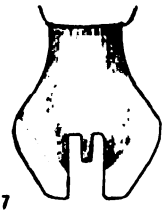
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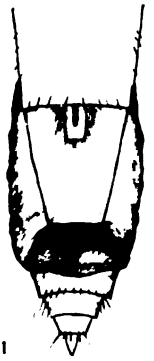
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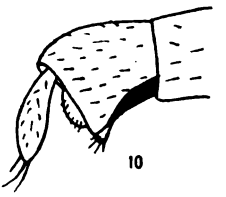
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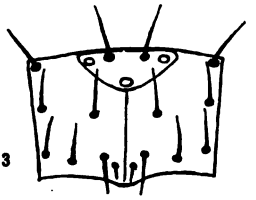
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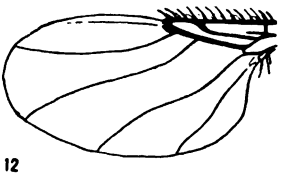
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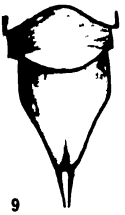
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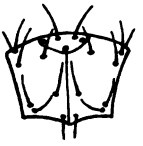
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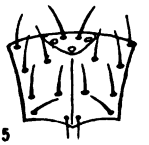
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DETAILS OF SPECIES OF PHORIDÆ.

FOR EXPLANATION OF PLATE SEE PAGE 528.

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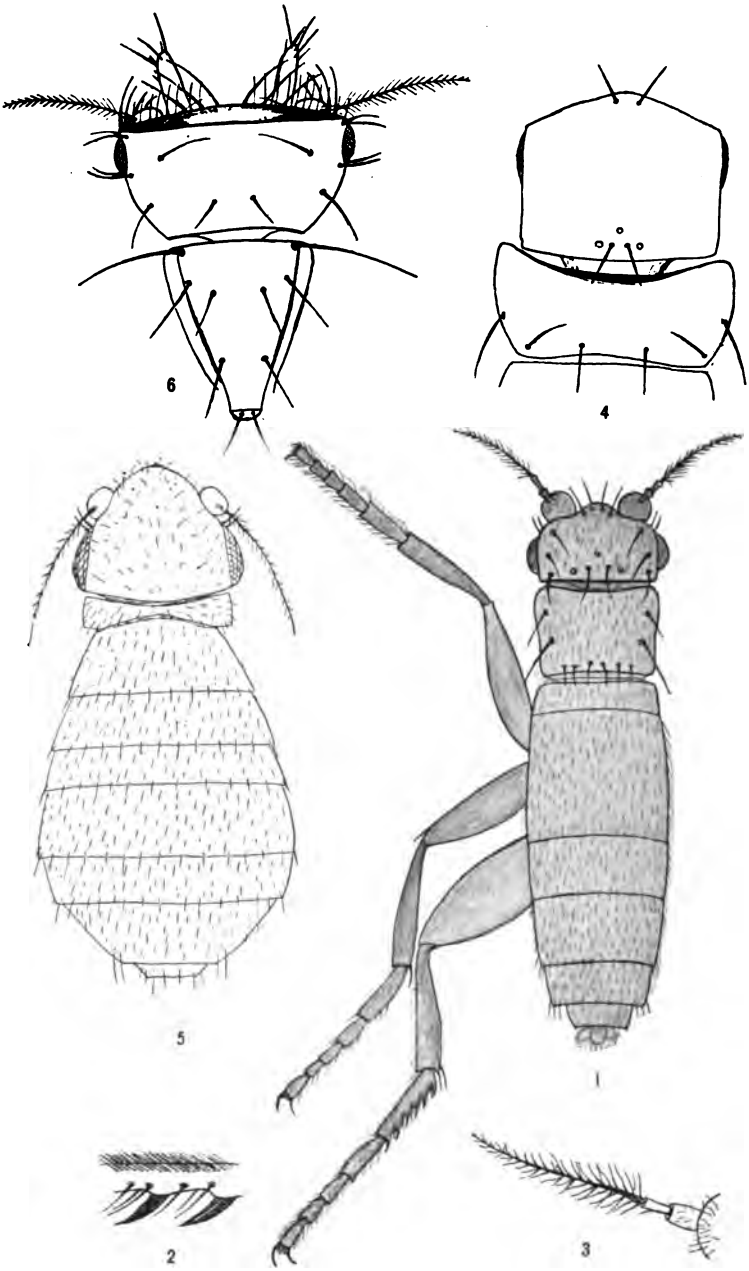

DETAILS OF SPECIES OF PHORIDÆ.

FOR EXPLANATION OF PLATE SEE PAGE 529.

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Barbara Islands, California. To all of these institutions and individuals the writer wishes to express his obligation; also particularly to Dr. Charles W. Richmond, the Assistant Curator of Birds in the United States National Museum.

The geographical range of *Ardea herodias*, as a species, extends from southern Alaska and southern Canada, south through the United States, Mexico, Central America, and the West Indies, to northern South America. Although the available specimens from some regions are few, there are apparently 10 recognizable races, which subsequent investigation of abundant material may increase by one or two. There are already six current forms, so that the present investigation has resulted in the addition of four. The great blue heron lives in almost any sort of country, forest or open, desert or humid, if it has only the one requisite—water, from which it obtains the major portion of its food. It breeds usually in colonies, in trees or on the ground, and doubtless wanders far in search of food, along the shores, shallows, and muddy banks of streams, lagoons, and ponds, which are its favorite hunting grounds. Too little is known of the details of distribution to permit a very decided opinion on the life zone affinities of the various subspecies, but from what we know it does not appear that, except in a general way, they conform very well to accepted zonal boundaries, as suitable nesting sites are often the controlling influence. Consequently, the attempt to give them some such status must be taken with proper reservation. Most of the races are more or less migratory, though some of this movement is doubtless the well-known præstival and postæstival wandering in which herons so commonly indulge. Two forms, *Ardea herodias cognata*, and *Ardea herodias oligista*,[1] with probably also *Ardea herodias sanctilucae*, and possibly *Ardea herodias fannini*, are sedentary, or at least do not pass beyond their ascribed breeding areas. As in so many other wide-ranging species, some of the far-separated subspecies resemble each other much more than they do the adjacent forms with which they must bear much closer phylogentic relationship. For instance, the West Indian race, *Ardea herodias adoxa*,[2] is much more nearly like *Ardea herodias herodias* than like the intervening *Ardea herodias wardi; Ardea herodias cognata*, from the Galapagos Islands, very much more closely resembles *Ardea herodias treganzai*, from the southwestern United States, than it does *Ardea herodias lessonii*[3] from Mexico; *Ardea herodias oligista*[1] and *Ardea herodias hyperonca*[4] are both much more like *Ardea herodias herodias* from the eastern United States than like the interposed *Ardea herodias treganzai;* while the Mexican *Ardea herodias lessonii*[3] is closest in appearance to *Ardea herodias fannini* of British Columbia, instead of to the

[1] See p. 553. [2] See p. 544. [3] See p. 555. [4] See p. 550.

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adjoining *Ardea herodias treganzai*, of Arizona, or the also intervening *Ardea herodias hyperonca*[1] of California. All but three of the races, *Ardea herodias sanctilucae*, *Ardea herodias cognata*, and *Ardea herodias oligista*,[2] have a range of considerable, in some cases, of wide extent, as seems to be often the case with large birds which wander about over a large area. The size of the various races does not seem to correspond with any regularity to geographic conditions, for while the southernmost form, *Ardea herodias cognata*, of the Galapagos Islands, is of small size, the smallest race is *Ardea herodias oligista*,[2] of the Santa Barbara Islands; while on the adjacent California mainland is one of the largest, *Ardea herodias hyperonca*,[1] beyond which, in the northernmost subspecies, *Ardea herodias fannini*, lives a bird of only medium size. Furthermore, the Floridian *Ardea herodias wardi* is larger than either *Ardea herodias adoxa*[3] from the West Indies, or *Ardea herodias herodias* from the northeastern United States.

The adult female of *Ardea herodias* is identical in color with the male, but averages smaller. Individual variation is slight, and consists principally in size, and in the color of neck and back. Seasonal change in plumage is likewise insignificant, probably because of the little wear to which the plumage is subject; and, though the neck sometimes becomes a little lighter in late summer, the back and other parts seemingly undergo little or no change. Apparently soon after the young are hatched, however, the color of the bare skin around the eye in the adult changes to yellowish green, and the maxilla becomes almost entirely dusky olive, leaving only its tomia and the mandible yellowish.

The young bird in first complete (i. e., juvenal) plumage differs considerably from the adult in having the whole pileum and upper sides of head dull, dark brown or brownish black; the entire neck and lower half of the sides of head much spotted or washed with buff, ochraceous, tawny, or chestnut; ground color of neck dull gray without any drab tinge; upper parts of body, wings, and tail, duller, more brownish, the long, plumelike development of dorsal and scapular feathers lacking; superior wing-coverts tipped or terminally spotted with ochraceous or tawny; edge of wing paler and more mixed with white; thighs somewhat lighter; breast and abdomen white, streaked broadly with gray and slate color, and more or less mixed with cinnamon rufous or buff; jugular plumes wanting; and the tufts on sides of breast gray striped with white; iris gamboge yellow; eyelids and bare horizontal lore space light apple green; maxilla black or blackish, the tomium brownish or horn color;

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minal half; tibia and soles of toes apple green; remainder of legs and feet black. From this stage the bird gradually passes into the adult plumage, and specimens with all sorts of combinations of adult and young plumages are to be found. Some individuals in juvenal plumage are smaller than adults, but the young bird becomes fully grown before assuming the adult livery.

The diagnostic characters most useful in separating the various races of *Ardea herodias* are size, together with the shade of color on the neck and upper parts. The posterior lower surface is practically the same in all the forms. The juvenal plumage in most cases reflects the color differences of the adult, though usually to a less degree. All measurements are given in millimeters, and have been taken as explained in the writer's paper on *Butorides virescens*.[1] In the averages none but typical specimens have been used, whenever such could be obtained. Furthermore, in the tables of detailed measurements every specimen used in the diagnostic averages is indicated; and all other than adults are properly noted. The names of colors employed are based on Mr. Robert Ridgway's Nomenclature of Colors.[2]

In working out the races of *Ardea herodias* it became necessary to determine as far as possible the status of *Ardea occidentalis* Audubon,[3] *Ardea wardi* Ridgway,[4] and the much discussed *Ardea würdemannii* Baird,[5] all from Florida, since this problem's solution bears directly on the proper name for the race of *Ardea herodias* inhabiting Florida. The detailed evidence concerning these birds will be presented in another paper.

ARDEA HERODIAS HERODIAS Linnæus.

[*Ardea*] *herodias* Linnæus, Syst. Nat., ed. 10, vol. 1, 1758, p. 143 (America) (based on "*Ardea fusca canadensis*," Edwards [="The Ash-colour'd Heron from North America," Edwards], Nat. Hist. Birds, vol. 3, 1750, p. 135, pl. 135; vol. 4, 1751, p. 245 [Hudson Bay]; and, with a query, on "*Ardea cristata maxima americana*," Catesby, Nat. Hist. Carolina, Fla., and Bahama Is., vol. 2, Appendix, 1753, p. 10, pl. 10 [Virginia]).

[*Ardea*] *hudsonias* Linnæus, Syst. Nat., ed. 12, vol. 1, 1766, p. 238 (Hudson Bay) (based on "*Ardea americae septentrionalis*" [="The Ash-colour'd Heron from North America"], Edwards, Nat. Hist. Birds, vol. 3, 1750, p. 135, pl. 135 [Hudson Bay]; and on "*Ardea freti hudsonis*," Brisson, Ornith., vol. 5, 1760, p. 407 [Hudson Bay]).

Chars. subsp.—Size rather small (compared with other races); neck and upper parts moderately dark in color.

Description.—Adult male, No. 153329, U.S.N.M.; Brewerton, New York, April 30, 1881; Edwin M. Hasbrouck. Sides of crown, and

[1] Oberholser, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 533.
[2] Ridgway, Nomenclature of Colors for Naturalists, Boston, 1886.
[3] *Ardea occidentalis* Audubon, Birds Amer. (folio), vol. 3, No. 57, 1835, pl. 281 (Florida Keys).
[4] *Ardea wardi* Ridgway, Bull. Nutt. Orn. Club, vol. 7, January, 1882, p. 5 (Oyster Bay, Florida).
[5] *Ardea würdemanni* Baird, Rep. Expl. and Surv. R. R. Pac., vol. 9, 1858, p. 669 (southern Florida).

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long, slender, pointed, occipital crest black; forehead, center of crown, short vertical crest, superciliary stripe, malar region, chin, and middle of upper throat, white; sides of head and throat drab gray; neck all around deep drab gray, the middle line of foreneck streaked with black, white, and cinnamon rufous; upper surface, including tail, tertials, innermost secondaries, and superior secondary coverts, slate gray, the long, narrow, plumaceous feathers of back and scapulars paler and glaucous, the median coverts and outer webs of greater coverts paler gray, the rectrices somewhat brownish and distally darker, inclining to slate color or blackish slate; primaries, secondaries (except the innermost), primary coverts, and alula, blackish slate, slate black or dull black; jugulum smoke gray, medially white, streaked broadly with black, dull brownish slate, narrowly with cinnamon rufous and pale cinnamon, the long, narrow, pointed plumelike feathers terminally pale drab gray, smoke gray or whitish; a tuft of black, partly white-striped feathers on each side of the breast; back of this a small patch of cinnamon rufous; sides and flanks slate gray; breast and abdomen black, broadly streaked with white; lower tail-coverts white; thighs and edge of wing cinnamon rufous, the latter shading to chestnut along the secondaries; lining of wing slate color, the axillars slate gray.

In full spring plumage the iris is chrome yellow; the bare orbital space cobalt blue; bill wax yellow, brighter on the mandible, the culmen sometimes brownish; legs black or dark brownish, the tibia usually more brownish; soles of toes dull yellowish.

Measurements.—Length (in flesh), 1067–1270 mm.; extent of wing, 1790–1920 mm.; weight, 5–8 pounds.

Male:[1] Wing, 441–280 (average, 462.7) mm.; tail, 167–187 (176.6); exposed culmen, 123–151.5 (139.5); height of bill at base, 23.5–31.3 (27.6); tarsus, 167–205 (183.6); middle toe, 93–114.5 (106.5).

Female:[2] Wing, 433–471 (451.2) mm.; tail, 159–184 (173.7); exposed culmen, 127–146 (137); height of bill at base, 24.5–28.5 (26.7); tarsus, 157–194 (175.4); middle toe, 93–115 (102.4).

Type-locality.—Hudson Bay, Canada.

Geographical distribution.—Eastern United States and southern Canada: In summer chiefly the Upper Austral, Transition, and Canadian zones, north to Anticosti Island and Godbout, northeastern Quebec; Lake Temiskaming, central Quebec; Moose Factory and Rat Portage, northern Ontario; Shoal Lake and Duck Mountain, central Manitoba; Osler, southern Saskatchewan; and Edmonton, central Alberta; west to southeastern British Columbia (probably); North Dakota; South Dakota; and probably eastern Nebraska;

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south to southern Alberta (probably); southern Saskatchewan (probably); eastern Nebraska (probably); central Iowa; central Illinois; central Indiana; eastern Tennessee; and near Charleston, central eastern South Carolina; east to the Atlantic coast of the United States and of southern Canada, and to the Bermuda Islands.[1] Winters from Florida, northern Tamaulipas, and Texas, north to New York State; also on the Bermuda Islands. In migration or in winter it wanders west to Prospect Lake, British Columbia.

The present subspecies appears to be very uniform over its entire range, at least the specimens examined so indicate. There seems to be little if any difference, in either size or color, between examples from New York and Connecticut and those from North and South Carolina. A specimen from Castleberry, Alabama, taken November 10, 1911, is large, but very dark, even for *Ardea herodias herodias*, and is nearer this than to *Ardea herodias wardi*. Another bird, taken at the same place on November 18, 1911, is typical *Ardea h. herodias*. Two birds from Mount Carmel, Illinois (U.S.N.M. Nos. 84577 and 84578), are slightly larger and slightly lighter above than typical examples of *Ardea herodias herodias*, inclining thus toward *Ardea herodias wardi*, but they are much nearer the present form. As these two were not breeding birds they were doubtless sojourners from another region, since the breeding form of this locality is *Ardea herodias wardi*. The breeding bird of Saskatchewan and Alberta is probably *Ardea herodias herodias*, although no specimens are at hand. An immature individual from Prospect Lake, British Columbia, September 18, 1896 (No. 73573, Amer. Mus. Nat. Hist.), is just like immature *Ardea herodias herodias*, so far as I can see, though it may possibly be an intermediate between *Ardea herodias treganzai* and *Ardea herodias fannini*. What is the breeding form of the Bermuda Islands is a little uncertain, as I have examined no specimens from there, but the probabilities favor its proper reference to *Ardea herodias herodias*.

All specimens from Florida are, of course, only winter residents, and this State seems to be a regular winter home for members of this subspecies. It winters, however, with apparent regularity also north to New York State, as there are several winter records of specimens from the States of New York, New Jersey, and Virginia. A single bird (No. 183328, U.S.N.M.) taken January 27, 1902, at Camargo, Tamaulipas, Mexico, on the Rio Grande, represents the southwestern limit of its known range. There is no certain record of its occurrence in Louisiana, though it doubtless occurs there during winter. A bird taken September 17, 1886, by naturalists of

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The original description of *Ardea herodias*[1] applies without doubt to the form of great blue heron inhabiting the northeastern part of North America. Linnæus' description was based on the "*Ardea fusca canadensis*," or "The Ash colour'd Heron from North America" of Edwards;[2] and with a query on the "*Ardea cristata maxima americana*" of Catesby;[3] both of which may be unquestionably referred to the great blue heron. Since Linnæus gives only "America" as the locality of his species, and since he apparently considered the identity of Catesby's bird doubtful, the type locality should, therefore, be Hudson Bay, from Edwards. The *Ardea hudsonias* of Linnæus[4] is a strict synonym of *Ardea herodias*, since it has in part the same basis—"*Ardea americae septentrionalis*" = "The Ash colour'd Heron from North America" of Edwards,[5]—and also the "*Ardea freti hudsonis*" of Brisson,[6] both of which refer to the bird from Hudson Bay.

In all, 76 specimens of this form have been examined, from the following localities, breeding records being indicated by an asterisk:

British Columbia.—Prospect Lake.

Nova Scotia.—Newport.*

Quebec.—Tadousac.

Alabama.—Castleberry.

Connecticut.—Liberty Hill; Rockville.

District of Columbia.—Washington.*

Florida.—Gainesville; Oak Lodge (eastern peninsula opposite Micco) (Feb. 1); Lake Harney (Dec. 3).

Illinois.—Mount Carmel.

Iowa.—Winnebago County.*

Maine.—Island Falls; Brewer.

Maryland.—Sandy Spring;* Glen Echo.*

Massachusetts.—Dedham.

New Hampshire.—Hollis.

New Jersey.—Haddonfield; Timber Creek;* Salem County;* Five Mile Beach (Cape May County);* Cape May County; South Atlantic City; Atlantic City; Masonville; Mouth of Delaware River (Jan. 26); Atlantic Ocean off coast of New Jersey (lat. 38° 29′ N.; long. 71° 58′ W.).

New York.—Brewerton;* Springs (Dec. 20); Long Island (Dec. 28); Shelter Island; Ardsley (Westchester County); Lawrence County; Oakdale (Suffolk County); Consook Marsh, Highland Falls (Dec. 12); Rockaway (Dec. 14).

[1] Linnæus, Syst. Nat., ed. 10, vol. 1, 1758, p. 143.

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North Carolina.—Currituck (Jan. 25); Hatteras.

Pennsylvania.—Conneautee Lake (Erie County); Holmesburg (Philadelphia);* Bristol (Bucks County).*

South Carolina.—Porcher's Bluff, Christchurch Parish.*

Virginia.—Cape Charles (Jan. 1); Strasburg; Dismal Swamp.*

Wisconsin.—Waupaca.

Tamaulipas.—Camargo.

Measurements of specimens of Ardea herodias herodias.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm mm	mm mm	mm mm	mm mm	mm mm	mm mm
U.S.N.M. 153329[1]	Male.....	Brewerton, N.Y.	Apr. 30, 1881	E. M. Hasbrouck.	465	180	144	30	175	109
H.W. Fowler 1316[1]	Male juv.[2]	Holmesburg (Phila.), Pa.	July 28, 1897	J. Walls.....	480	182	141	23.5	205	114.5
H.W. Fowler 1071[1]	Male....	Bristol, Bucks Co., Pa.	Apr. 9, 1896	W. Hall.....	447	176	123	24.5	172	99
U.S.N.M. 156226[1]	Male juv.[2]	Conneautee Lake, Pa.	Sept. 3, 1895	P.W. Roth..	465	175	134	27	188	105
A.N.S.Phila.33728[1]	..do[2]...	Haddonfield, N.J.	Oct. 29, 1879	S.N.Rhoads.	448	167	133	27	176	93
H.W. Fowler 1315[1]	...do[2]....	Timber Creek, N.J.	July 16, 1897	F. Schluter..	464	172	136	31.5	188.5	111
Am. Mus. N. H. 69403.[1]	Male....	Currituck, N.C.	Nov. 27, 1897	J.C. Barron .	468	180.5	151.5	27	197	109
Am. Mus. N. H. 74223.[1]	...do.....	Hatteras, N.C.	Mar. 6, 1900	J.H. Batty..	441	173	138	27	167	100
E.A. Preble 812[1]	...do.....	Strasburg, Va.	Apr. 28, 1900	E.A. Preble.	473	187	149	31	182	112
A.E. and O. Bangs 3171.[1]	...do.....	Oak Lodge (eastern peninsula opposite Micco), Fla.	Feb. 1, 1895	O. Bangs....	476	173	145.5	27.5	185	112.5
J. Dwight 15275[1]	Female juv.[2]	Springs, N.Y.	Nov. 28, 1905	.....	438	159	.....	25	168	101
J. Dwight 15243[1]	...do[2]...	.....do.....	Dec. 20, 1905	.....	450	170	135.5	26.5	177	100
J. Dwight 11571[1]	...do[2]...	Shelter Island, N.Y.	Oct. 1, 1904	W.W. Worthington.	433	166	131	24.5	174	95
J. Dwight 6777[1]	Female..	.....do.....	Sept. 25, 1899	.....do.....	435	166	127	27	160	100
Am. Mus. N. H. 70305.[2]	Female juv.	Ardsley, Westchester Co., N.Y.	Oct. 13, 1898	C. Travis....	425	163	121.5	26	162.5	100
Am. Mus. N. H. 66762.[2]	...do.....	Lawrence Co., N.Y.	Aug. 27, 1895	O. A. Schroeder.	450	169	120	24.5	172.5	105
A.E. and O. Bangs 4572.[1]	Female..	Liberty Hill, Conn.	Apr. 10, 1895	.....	463	178	133	28.5	167	99
H.W. Fowler 1317[3]	Female juv.	Holmesburg (Phila.) Pa.	Aug. 13, 1897	J. Walls.....	464	179	135	29.5	195	106
W. Stone 1974[1]....	Female..	Salem County, N.J.	May 7, 1896	D.N. McCadden.	459	182	138.5	27	181	103
A.N.S.Phila.26026[1]	...do.....	Five Mile Beach, Cape May Co., N.J.	Apr. 14, 1879	W. L. Abbott.	471	184	136.5	26.3	188.5	103
U.S.N.M. 79367[1]...	...do.....	Sandy Spring, Md.	Mar. —, 1890	R. Ridgway.	435	164	140	27	157	93
M.C.Z. 42543[1].....	...do.....	Currituck, N.C.	Jan. 25, 1887	W.S. Bryant	460	182	145	28.5	194	115
U.S.N.M. 222008[1].	...do.....	Porcher's Bluff, Christchurch Parish, S.C.	Apr. 28, 1911	E.A. Mearns.	455	172	146	27.5	180	108
U.S.N.M. 84577[1]..	...do.....	Mount Carmel, Ill.	.....	C. W. Ridgway.	450	181	138	27	178	111
U.S.N.M. 183328[1].	...do.....	Camargo, Tamaulipas Mex.	Jan. 27, 1902	E. A. Goldman.	465	180	136	26	180	101

[1] Used in measurement averages on p. 535.
[2] Full grown, but in juvenal plumage.
[3] Not full grown.

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Measurements of specimens of Ardea herodias herodias—Continued.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm.	mm.	mm.	mm.	mm.	mm.
Am. Mus. N. H. 73873.[1]	Female juv.	Prospect Lake, Brit. Col.	Sept. 18, 1896	.....	442	173	123	27.5	161	89.5
Am. Mus. N. H. 45753.	.....	Long Island, N. Y.	.....	.....	429	162	139	25.5	159.5	97
A.N.S.Phila.39659.	.....	Mouth of Delaware River [N. J.?]	Jan. 26, 1903	W.D.Winsor	432	175	140	25.5	173	98
A.N.S.Phila.39660.	Juv.....	.....do.....	...do.....	.....do.....	436	159	134.5	27	167	101.5
A.N.S.Phila.26025.	..do.....	Cape May Co., N. J.	Nov.27, 1878	W. L. Abbott.	432	164	133.5	26	176.5	94.5
A.N.S.Phila.58251.	...do.....	South Atlantic City, N. J.	Sept.—, 1899	C. W. Buvinger and J. A.G.Rehn.	470	177	145.5	27.5	193	111
A.N.S.Phila.34916.	.....	Masonville, N. J.	.....	L. Rodgers..	451	180	134	25.5	160	108
A.N.S.Phila.48276.	Juv.....	Salem Co., N. J.	Feb. 6, 1905	W. Hughes..	445	179	125	25	176	101
W. Stone 1207.....	.....	Atlantic City, N. J.	Oct. 2, 1892	I. N. De Haven.	452	174	146	27.5	181	106.5
Am. Mus. N. H. 74173.	.....	Cape Charles, Va.	Jan. 1, 1901	G. A. Smith.	445	181	138	28.5	179.5	109
U.S.N.M. 159980...	Juv.....	Dismal Swamp, Va.	June 20, 1897	D. W. Prentiss, jr.	456	177	139	27.5	195	117
U.S.N.M.....	.....	Castleberry, Ala.	Nov. 18, 1911	W. Matthews	464	181	129	28	179	102
U.S.N.M.....	.....	.....do.....	Nov. 10, 1911	.....do.....	490	184	155	29.8	195	114
A.N.S.Phila.26027.	Juv.....	Winnebago Co, Iowa.	Aug. 19, 1879	W. L. Abbott.	435	171	126	26.5	169	99

ARDEA HERODIAS WARDI Ridgway.

Ardea wardi RIDGWAY, Bull. Nutt. Orn. Club, vol. 7, January, 1882, p. 5 (Oyster Bay, Florida).

Chars. subsp.—Similar to *Ardea herodias herodias*, but decidedly larger in all its measurements; upper surface and neck lighter in color.

Measurements.—Total length (in flesh), 1295–1335 mm.; extent of wing, 1970–2090.

Male:[2] Wing, 486–518 (average, 497.7) mm.; tail, 181–209 (191.5); exposed culmen, 146–167 (156.9); height of bill at base, 28.5–32 (30.8); tarsus, 195–232 (210.9); middle toe, 115–129 (119.9).

Female:[3] Wing, 471–489 (477.2); tail, 173–192 (181.5); exposed culmen, 140–147 (143.7); height of bill at base, 27–30.5 (28.1); tarsus, 189–214 (205.4); middle toe, 111–123 (116.2).

Type-locality.—Oyster Bay, Florida.

Geographical distribution.—Southeastern United States to central Mexico: In summer chiefly the Lower Austral Zone, north to Hiltonhead, southeastern South Carolina; southern Georgia; southern Alabama; Knox County, southwestern Indiana; Mount Carmel, southeastern Illinois; Henry County, southeastern Iowa; and Kansas; west to Kansas; central Oklahoma; Gainesville and probably Gurley,

[1] Full grown, but in juvenile plumage.
[2] Fourteen specimens, from Florida, Georgia, Texas, and Jalisco.
[3] Eight specimens, from Florida.

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Texas; south to the Florida Keys and the Gulf coast of the southern United States, from Florida to Brownsville, Texas; east to the Atlantic coast of South Carolina, Georgia, and Florida. Winters in Florida, southern Alabama, and Texas; also in Mexico, south to Ocotlan, Jalisco.

This is a well-characterized form, and is easily distinguishable from *Ardea herodias herodias*. Even in the juvenal plumage it is usually paler on neck and upper surface than is *Ardea h. herodias*. A series of breeding birds from a cypress swamp near the mouth of the White River, in the southwestern corner of Knox County, Indiana, and one specimen from Mount Carmel, Illinois (No. 72837, U.S.N.M.), just across the Wabash River, are smaller than *Ardea herodias wardi* from Florida, and in this seem to be rather closer to *Ardea herodias herodias*, yet in color they average much nearer *Ardea herodias wardi*. A single example from Henry County, southeastern Iowa (No. 12358, J. Dwight), and another from an unknown but probably eastern locality in Kansas (No. 72836, U.S.N.M.) are pale like *Ardea herodias wardi*, and also large, too large, in fact, for *Ardea herodias herodias*. The present race thus doubtless occupies the southern Mississippi Valley, including eastern Kansas, eastern Oklahoma, and eastern Texas. A breeding bird from Hiltonhead, southeastern South Carolina (No. 39031, U.S.N.M.), is like *Ardea herodias wardi* in color, but is smaller, and in this somewhat intermediate between *Ardea herodias wardi* and *Ardea herodias herodias*. The same remarks will apply also to a specimen from Ossabaw Island, Georgia (No. 11902, J. Dwight), taken November 29, 1904. This Hiltonhead, South Carolina, record doubtless represents about the northernmost limit of the breeding range of this subspecies on the Atlantic coast, for the breeding form about Charleston is *Ardea herodias herodias*. No specimens from Mississippi or from the central or northern portions of Georgia or Alabama have been available, but *Ardea herodias wardi* without doubt occupies in summer the southern part of all these States. Birds from Corpus Christi, Texas, seem to be identical in both size and color with those from Florida. The following comparative averages of millimeter measurements of specimens from various parts of the range of *Ardea herodias wardi* show what differences exist:

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Localities.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
	mm.	mm.	mm.	mm.	mm.	mm.
Eleven males, from Florida and Georgia	499.1	192.3	158	31.1	211	119.3
Two males, from Texas	496	185.5	156.5	30	214.5	123
One male, from Jalisco, Mexico	486	195	146	29	202	115
Six males, from southwestern Indiana	476	182.2	145.7	27.8	183.4	107.6
One male, from southeastern Iowa	486	190	153	29	194	119
One male, from Kansas	490	184	158	29	202	107
Seven females, from Florida	477.2	181.5	143.7	28.1	205.4	116.2
Two females, from southwestern Indiana and southeastern Illinois	453	185.5	138	26.3	180.5	106

This subspecies is evidently resident in Florida, as there is no West Indian or Bahaman specimen; and there are numerous winter records for Florida. It winters also north at least to southern Alabama, probably farther in the Mississippi Valley. An example which Messrs. E. W. Nelson and E. A. Goldman obtained at Ocotlan, Jalisco, Mexico, on December 25, 1902 (No. 184944, U.S.N.M.), seems to be undoubtedly of this form, and probably marks nearly or quite the southern limit of its winter range.

It breeds rather early in the year, at least in Florida; commonly in March (Suwanee River, Lafayette County, March 21, 1890, Mr. F. M. Chapman; Fort Gardner, March 9, 1901, Dr. E. A. Mearns); and, occasionally, at least, by the middle of January, for Mr. C. A. Smith found nest and eggs at Rutland, Florida, on January 15, 1890.

The form of *Ardea herodias* here called *Ardea herodias wardi* was first described by Mr. Ridgway as a full species,[1] on the hypothesis that *Ardea herodias*, *Ardea occidentalis*, and *Ardea wardi* should be regarded as three distinct species, of which the last two were considered to possess both a white and a colored phase. That, however, *Ardea wardi* is but a subspecies of *Ardea herodias*, is evident from the regular intergradation with *Ardea herodias herodias* that takes place wherever the ranges of the two closely approach, from South Carolina to Illinois. Furthermore, pure white birds (*Ardea occidentalis*) occur only on the Florida Keys and the adjacent West Indian islands; and the so-called *Ardea würdemannii* only where the ranges of *Ardea occidentalis* and *Ardea wardi* overlap. The complicated and puzzling relationships of these four birds—*Ardea occidentalis*, *Ardea würdemannii*, *Ardea wardi*, and *Ardea herodias*—will be more fully discussed in a separate paper. Suffice it here further to state that the writer regards *Ardea herodias* as specifically distinct from *Ardea occi-*

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occidentalis a distinct species; and *Ardea würdemannii* a hybrid between *Ardea herodias wardi* and *Ardea occidentalis*.

The writer has seen 60 specimens of *Ardea herodias wardi* from the subjoined localities, an asterisk marking records of breeding birds:

Alabama.—Orange Beach, Perdido Bay, Baldwin County (Jan. 28).

Florida.—Drigg's Landing, Kissimmee River;* De Soto County (Dec. 8); Jacksonville; Lake Harney; eastern peninsula opposite Micco; near Micco;* San Mateo;* Palatka (Jan. 29); Gainesville; Sebastian (Jan. 29); Lake Hatch-ne-haw;* Clive Key;* Fort Bassinger; Punta Rassa (Mar. 10);* Suwanee River, Lafayette County;* Fort Gardner, Kissimmee River;* Clearwater; Seven Oaks;* Bremer Island, Lake Kissimmee;* Rutland; Tarpon Springs;* northern Brevard County; Amelia Island (Dec. 14); Amelia Island;* New Smyrna; Hernando County.*

Georgia.—St. Marys;* McIntosh County;* Ossabaw Island.

Illinois.—Mount Carmel.*

Indiana.—Cypress Swamp, near mouth of White River, southwestern Knox County.*

Iowa.—Henry County, 4 miles north of Hillsboro.

Kansas.—(No definite locality specified.)

South Carolina.—Hiltonhead.*

Texas.—Corpus Christi.*

Jalisco.—Ocotlan (Dec. 25).

Measurements of specimens of Ardea herodias wardi.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm	mm	mm	mm	mm	mm
U.S.N.M. 77946[1]	Male	Hernando Co., Fla.	Mar. 30, 1879	J. W. Milner.	490	200	159	30	209	120
U.S.N.M. 90137[1]	do	Punta Rassa, Fla.	Mar. 10, 1883	C. W. Ward.	498	194	167	32	217	122
U.S.N.M. 152839[1]	do	Florida	—— —, 1895	W. F. Webb.	488	186	152	32	211	117
U.S.N.M. 175531[1]	do	Fort Gardner, Fla.	Mar. 9, 1901	E. A. Mearns	500	185	153	30.5	213	116
U.S.N.M. 82329[1,2]	do	Near Oyster Bay, Fla.[2]	Mar. —, 1881	C. W. Ward.	518	198	166	32	225	129
Am. Mus. N. H. 99101.[1]	do	Near Micco, Fla.	Apr. 8, 1898	L. A. Fuertes.	492	181	152.5	31	198	115
Am. Mus. N. H. 49599.[1]	do	Suwanee River, Lafayette Co., Fla.	Mar. 21, 1890	F. M. Chapman.	504	188.5	159.5	32	211	119
J. Dwight 24596[1]	do	Seven Oaks, Fla.	Apr. 6, 1901	.....	493	195	140.5	30.5	195	118
U.S.N.M. 175423[1]	do	Lake Hatch-ne-haw, Fla.	Feb. 14, 1901	E. A. Mearns.	503	197	167	31	232	121
Am. Mus. N. H. 39085.	Male(?), juv.	Eastern peninsula, opposite Micco, Fla.	Mar. 6, 1889	F. M. Chapman.	460	163.5	150	31	202	109
J. Dwight 24597[1]	Male	McIntosh Co., Ga.	Mar. 27, 1890	W. W. Worthington.	486	182	161	30	200	119

[1] Used in measurement averages on p. 539. [2] Type.

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Measurements of specimens of Ardea herodias wardi—Continued.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					1/10 mm.	1/10 mm.	1/10 mm.	1/10 mm.	1/10 mm.	1/10 mm.
A. E. and O. Bangs 3068.[1]	Male....	St. Marys, Ga.	Mar. 26, 1896	O. Bangs....	511	209	160	31.5	210	122
Am. Mus. N. H. 79706.[1]	...do....	Corpus Christi, Tex.	Mar. 30, 1878	G. B. Sennett.	495	188	165	31.5	215	120
Am. Mus. N. H. 79705.[1]	...do....	.....do.....	.....do.....	.....do.....	497	183	148	28.5	214	126
U.S.N.M. 184944[1]..	...do....	Ocotlan, Jalisco, Mex.	Dec. 25, 1902	E. W. Nelson and E. A. Goldman.	486	195	146	29	202	115
U.S.N.M. 71162....	...do....	Cypress Swamp, near m'th of White River, southwestern Knox Co., Ind.	June 11, 1877	R. Ridgway.	468	176	151	27.5	177	107
U.S.N.M. 71161....	...do....	.....do.....	.....do.....	.....do.....	480	185	145	27.5	190	110
U.S.N.M. 84576....	...do....	.....do.....	.....do.....	.....do.....	490	190	144	28	178	100
U.S.N.M. 71168....	...do....	.....do.....	.....do.....	.....do.....	.....	.....	144	27.5	.....	.....
U.S.N.M. 71165....	...do....	.....do.....	.....do.....	.....do.....	486	183	145	28.5	187	112
Am. Mus. N. H. 26262.	...do....	.....do.....	.....do.....	.....do.....	465	177	145	28	185	109
J. Dwight 12358...	...do....	Henry Co., 4 miles north of Hillsboro, Iowa.	Apr. 2, 1899	J. A. Savage.	486	190	153	29	194	119
U.S.N.M. 72836....	[Male]...	Kansas.....	.....	.....	490	184	158	29	202	107
U.S.N.M. 175532[1]..	Female.	Fort Gardner, Fla.	Mar. 9, 1901	E. A. Mearns	.....	.....	140	28	.....	.....
U.S.N.M. 150081[1]..	...do....	Drigg's Landing, Kissimmee River, Fla.	Mar. 19, 1895	R. Ridgway.	475	182	146	29.5	212	120
U.S.N.M. 152148[1]..	...do....	Fort Bassinger, Fla.	Feb. 18, 1896	.....do.....	472	192	147	27.5	213	115
J. Dwight 13394[1]..	...do....	Northern Brevard Co., Fla..	Feb. 16, 1905	W. W. Worthington.	474	182	142	27	214	116
Am. Mus. N. H. 99102.[1]	...do....	Near Micco, Fla.	Apr. 8, 1898	L. A. Fuertes.	489	180	147	30.5	211.5	123
Am. Mus. N. H. 36981.[1]	...do....	Rutland, Fla.	Jan. 15, 1890	C. A. Smith.	482	173	140	27	189	111
Am. Mus. N. H. 50613.[1]	Female, juv.	Tarpon Springs, Fla.	Aug. 10, 1886	W. E. D. Scott.	471	180	.....	27.5	193	112
J. Dwight 11902...	Female.	Ossabaw Island, Ga.	Nov. 29, 1904	W. W. Worthington.	462	182	138	26	185	103
U.S.N.M. 39031....	...do....	Hiltonhead, S. C.	May 19, 1864	D. W. Prentiss.	464	182	142	25.5	198	107
U.S.N.M. 71169....	...do....	Cypress Swamp, near m'th of White River, southwestern Knox Co., Ind.	June 11, 1877	R. Ridgway.	.....	.....	137	25.5	.....	.....
U.S.N.M. 72837....	[Female]	Mount Carmel, Ill.	May 31, 1874	J. L. Ridgway.	453	185.5	139	27	180.5	106
U.S.N.M. 126114...	.....	San Mateo, Fla.	Mar. 29, 1892	W. L. Ralph.	488	180	160	29.5	226	126
U.S.N.M. 89966....	.....	Jacksonville, Fla.	.....	T. B. Ferguson.	470	182	139	26.2	176	101

[1] Used in measurement averages on p. 539.

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ARDEA HERODIAS ADOXA, new subspecies.

Chars. subsp.—Much like *Ardea herodias herodias*, but paler above, and apparently, at least in the female, of somewhat smaller size.

Description.—Adult female, No. 97914, U.S.N.M.; Curaçao Island, Caribbean Sea, February 10–18, 1884: Sides of crown, and occipital crest, black; forehead, center of crown, short vertical crest, superciliary stripe, sides of head, malar region, chin, and center of upper throat, white; broad subauricular stripe pale drab gray; neck all around deep drab gray, the middle line of foreneck streaked with black, white, and cinnamon rufous; upper surface, including tail, tertials, innermost secondaries, and superior secondary coverts, rather light slate gray, the long narrow plumaceous feathers of back and scapulars paler and glaucous, the median coverts and outer webs of greater coverts paler gray, the rectrices brownish on inner webs; primaries, secondaries (except the innermost), primary coverts, and alula, blackish slate, slate black, or dull black; jugulum smoke gray, medially white, streaked broadly with blackish slate, slate gray, and smoke gray, the long, narrow, pointed, plume-like feathers terminally pale smoke gray or white; a tuft of black, partly white-striped feathers on each side of the breast; back of this a patch of cinnamon rufous; sides and flanks slate gray; breast and abdomen black, broadly streaked with white; lower tail-coverts white; thighs and edge of wing tawny chestnut, the latter shading to chestnut; under wing coverts partly slate color, partly slate gray, some with whitish shaft streaks; axillars slate gray.

Measurements.—Probable male:[1] Wing, 460–468 (average, 464.7) mm.; tail, 177–185 (180); exposed culmen, 134–150 (143); height of bill at base, 26.5–28.7 (27.7); tarsus, 178–187 (181.7); middle toe, 109–113 (111.3).

Female:[2] Wing, 430–447(440.5); tail, 168–172 (170.5); exposed culmen, 121–131 (127.8); height of bill at base, 24–26.5 (24.8); tarsus, 162–175 (167.5); middle toe, 92–108 (102).

Type-locality.—Island of Curaçao.

Geographical distribution.—Bahama Islands, West Indies, Curaçao, and Trinidad:[3] resident in the upper Tropical Zone, north to Andros and Inagua islands, Bahama Islands; west to Cuba; south to Jamaica; and east to Inagua Island, Bahama Islands. In winter also north to Bimini and Berry islands, Bahama Islands; east to New Providence Island, Bahama Islands, Santo Domingo, Porto Rico, and the islands of St. Croix, Sombrero, St. Bartholemew, Barbuda, An-

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Vincent, Carriacou, and Grenada; south to the Isle of Pines, Curaçao, and Trinidad.

This race is of the size of *Ardea herodias herodias* or even smaller, and in color is somewhat intermediate between *Ardea herodias herodias* and *Ardea herodias wardi*. It is thus decidedly smaller throughout and rather darker above than *Ardea herodias wardi*. All the available immature birds from the West Indies, excepting an adventitiously stained one from Jamaica, are fully as pale above as young *Ardea h. wardi*, and are even more different in color from the corresponding stage of *Ardea herodias herodias* than are adults. In size these immature birds are less than immature *Ardea herodias herodias*. Two breeding birds from Inagua Island, Bahama Islands, are apparently just like other West Indian birds.

Specimens examined number eight, from the following localities in the West Indies and Bahama Islands, breeding records being noted by an asterisk:

Sombrero Island.
Curaçao Island.
Jamaica.—Spanishtown.
Grenada Island.—Telescope Swamp.
Guadeloupe Island.
*Inagua Island (Bahama Islands).**

Measurements of specimens of Ardea herodias adoxa.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm	mm	mm	mm	mm	mm
Am. Mus. N. H. 26504.[1]	[Male]...	Sombrero Id., W. I.	.....	A. Julien....	466	185	145	28.7	180	109
U.S.N.M. 114910[1]..	[Male] juv.	Guadeloupe Id., W. I.	.....	L. Guesde...	468	178	134	26.5	178	112
U.S.N.M. 81141[1]..	...do.....	Grenada Id., W. I.	Nov. 29, 1880	J. G. Wells..	460	177	150	28	187	113
Field Mus. N. H. 33764[1].	Female.	Inagua Id., Bahama Islands.	Mar. 28, 1888	C. J. Maynard.	447	168	130	24	163	104
Field Mus. N. H. 33763.[1]	...do.....	.....do.....	Mar. 2, 1891	C. S. Winch.	430	170	121	24	162	92
U.S.N.M. 109058[1]..	[Female] juv.	Guadeloupe Id., W. I.	.....	L. Guesde...	445	172	129	24.5	175	104
U.S.N.M. 30346[1]..	Female juv.	Spanishtown, Jamaica.	Dec. 10, 1863	W.T.March.	440	172	131	26.5	170	108
U.S.N.M. 97914....	.....	Curaçao Island.[2]	Feb. 10–18, 1884.	.....	447	179	145	30	172	104

[1] Used in measurement averages on p. 544. [2] Type.

ARDEA HERODIAS TREGANZAI Court.

Ardea herodias treganzai COURT, Auk, vol. 25, July, 1908, p. 291 (Egg Island, Great Salt Lake, Utah).

Chars. subsp.—Resembling *Ardea herodias herodias*, but upper parts and neck paler; also in size averaging very slightly larger.

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Measurements.—Total length (in flesh), 1100–1170 mm.; extent of wing, 1755–1845.

Male:[1] Wing, 445–493 (average, 471.7) mm.; tail, 162–192 (179.9); exposed culmen, 132–157 (144.3); height of bill at base, 26–31 (28); tarsus, 165–193 (181.6); middle toe, 99–112.5 (105.9).

Female:[2] Wing, 440–475 (455.5); tail, 164–182 (174.2); exposed culmen, 120.5–150 (137.2); height of bill at base, 25–28 (26.1); tarsus, 157–183 (170.5); middle toe, 89–107.5 (100.7).

Type locality.—Egg Island, Great Salt Lake, Utah.

Geographical distribution.—Western United States to southwestern Mexico: In summer chiefly the Lower Austral, Upper Austral, and Transition zones, north to Douglas County, southern Wyoming; Grace, southern Idaho; probably also to Montana and eastern Washington; west to central Washington (probably); central Oregon (probably); Nevada; Colorado River near Riverside Mountain, and Pelican Island, Salton Sea, southeastern California; and the Pacific Ocean at the United States and Mexican boundary line;[3] south to Gardner's Laguna, Salton River, northern Lower California; Guaymas, central western Sonora;[4] Santa Cruz River west of the Patagonia Mountains, Arizona; Fort Fillmore and Carlsbad, southern New Mexico; Tornillo Creek, near Boquillas, central western Texas; and probably also northern Chihuahua; east to Kerr County, central Texas (probably); Denver, central Colorado; Douglas County, eastern Wyoming; and probably eastern Montana. Winters from Texas and Arizona south to Manzanillo, Colima, Mexico. In migration wanders west to the Sacramento Valley, California, and east to Corpus Christi, Texas.

This western race is apparently just like *Ardea herodias wardi* in color, but is decidedly smaller throughout. It differs from *Ardea herodias adoxa*, of the West Indies, in somewhat paler upper parts and slightly larger size. It is, in fact, closer in characters to this than to either *Ardea herodias herodias* or *Ardea herodias wardi*. The juvenal plumage of *Ardea herodias treganzai* is distinguishable from that of *Ardea herodias herodias* by its decidedly paler upper parts and usually paler neck.

There seems to be no difference of consequence between birds from various parts of this bird's range, as above defined. An immature specimen from Brownsville, Texas (No. 30259, J. Dwight), is apparently this form; as is also a bird from Corpus Christi (No. 79707, Amer. Mus. Nat. Hist.), taken at the late date of April 11 (1889). We have only the head and part of the neck of an immature,

[1] Fourteen specimens, from Arizona, New Mexico, Texas, Idaho, and California, including seven not

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apparently non-breeding example from the Pacific Ocean at the Mexican and United States boundary line (No. 133774, U.S.N.M.), taken July 16, 1894, but it seems to belong to this race, notwithstanding that the form from San Diego, California, is not the same. No breeding examples from the San Joaquin Valley, or from the southern Sacramento Valley, California, have been available, and we therefore can not determine the summer resident of this region. A single specimen without date, from the Sacramento Valley (No. 9472, U.S.N.M.), is apparently *Ardea herodias treganzai*, but it is doubtless a migrant or a straggler.

Altogether, 36 specimens have been seen, from the localities given below, breeding records being followed by an asterisk:

Arizona.—Sonoyta River at Quitobaquita (Feb. 4); Fort Verde; Gila River, 7 miles below San Carlos; Santa Cruz River, west of Patagonia Mountains;* Fort Lowell; Tucson; San Bernardino Ranch; Colorado River at Monument 204 (Mexican boundary line).*

California.—Sacramento Valley; Pacific Ocean at the Mexican boundary line.

Idaho.—Grace.*

Montana.—Gallatin Station.

New Mexico.—Luna; San Luis Springs.*

Texas.—Fort Clark (Jan. 24); Corpus Christi; Brownsville (Feb. 22).

Wyoming.—Douglas.*

Chihuahua.—Rio Grande River near El Paso, Texas (Feb. 27); San Diego.

Colima.—Manzanillo.

Lower California.—Gardner's Laguna, Salton River.*

Sonora.—Cajon Bonito Creek, near the United States boundary line.

Measurements of specimens of Ardea herodias treganzai.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm mm	mm mm	mm mm	mm mm	mm mm	mm mm
U.S.N.M. 204448[1]	Male, juv.	Luna, N. M.	Sept. 6, 1908	C. Birdseye.	473	182	138	28.5	179	110
Am. Mus. N. H. 51038.[1]	Male	Fort Verde, Ariz.	.....	E. A. Mearns	477	188	146.5	28	179	100.5
Am. Mus. N. H. 51034.[1]	...do.....	.....do.....	Dec. 26, 1885	.....do.....	456	175	135	27	187	107.5
Am. Mus. N. H. 51033.[1]	...do....	.....do.....	Sept. 13, 1885	.....do.....	471	184	143	29	188	105
Am. Mus. N. H. 79707.[1]	...do.....	Corpus Christi, Tex.	Apr. 11, 1889	G. B. Sennett.	468	178	150	31	186	112.5
U.S.N.M. 9472[1]	...do	Sacramento Valley, Cal.	.....	R. S. Williamson.	464	180	140	28	181	107

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Measurements of specimens of Ardea herodias treganzai—Continued.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm	mm	mm	mm	mm	mm
U.S.N.M. 133029[1]..	Female.	Colorado River at Monument 204, Mexican boundary line, Ariz.	Mar. 22, 1894	E. A. Mearns	455	171	142	26.5	174	100
Am. Mus. N. H. 51031.[1]	...do.....	Gila River, 7 miles below San Carlos, Ariz.	Oct. 17, 1884	.....do.....	.....	167	125	25	157	89
Am. Mus. N. H. 51030.[1]	...do.....	Fort Verde, Ariz.	Oct. —, 1884	.....do.....	448	179	122.5	26	168	105
Am. Mus. N. H. 51035.[1]	...do.....	.....do.....	Feb. 23, 1887	.....do.....	455	175	142	28	170	100.5
Am. Mus. N. H. 51037.[1]	...do.....	.....do.....	Feb. 9, 1888	.....do.....	454	176	127.5	26	163	96.5
Am. Mus. N. H. 51036.[1]	...do.....	.....do.....	Feb. 23, 1887	.....do.....	469	182	140	27.5	172.5	101
U.S.N.M. 208756[1]..	...do.....	Egg Island, Great Salt Lake, Utah.[2]	Apr. 10, 1907	A. O. Treganza.	457	181	135	27	182	107
J. Dwight 17594[1]..	...do.....	Douglas, Wyo.	Apr. 12, 1891	.....	440	178	135	25	165	96.5
U.S.N.M. 121370[1]..	Female, juv.	Gallatin Station, Mont.	Sept. 5, 1888	C. W. Richmond.	453	175	120.5	26	171	105
E. A. Mearns 11706.[1]	Female..	Fort Clark, Tex.	Jan. 24, 1898	E. A. Mearns	450	174	140	26	175	102
J. Dwight 30259[1]..	Female, juv.	Brownsville, Tex.	Feb. 22, 1911	A. P. Smith.	463	181	138	28	183	100
U.S.N.M. 125829[1]..	Female.	Rio Grande (near El Paso, Tex.), Chihuahua, Mex.	Feb. 27, 1892	E. A. Mearns	475	172	131	26	172	98
Am. Mus. N. H. 56584.[1]	...do.....	San Diego, Chihuahua, Mex.	Feb. 2, 1891	.....	455	175.5	137	26.5	174	107.5
U.S.N.M. 133775[1]..	...do.....	Gardner's Laguna, Lower Cal., Mex.	Apr. 14, 1894	E. A. Mearns	468	182	147	27	179	104
U.S.N.M 141509...	Juv.....	Manzanillo, Colima, Mex.	Feb. 14, 1892	E. W. Nelson and E. A. Goldman.	471	172	152	32.5	201	112

ARDEA HERODIAS SANCTILUCAE Thayer and Bangs.

Ardea herodias sancti-lucæ THAYER and BANGS, Proc. New Engl. Zool. Club, vol. 4, February 23, 1912, p. 83 (Espiritu Santo Island, Lower California, Mexico).

Chars. subsp.—Like *Ardea herodias treganzai*, but larger throughout, and with neck of a paler color.

Measurements.—Male:[3] Wing, 475–500 (average, 485.5) mm.; tail, 179–195 (188.0); exposed culmen, 147–157 (150.8); height of bill at base, 28–30.5 (29.2); tarsus, 177–197 (189.6); middle toe, 106–115 (112.0).

Female:[4] Wing, 455; tail, 175; exposed culmen, 132; height of bill at base, 26.5; tarsus, 169.5; middle toe, 99.

[1] Used in measurement averages on p. 546.
[2] Type.
[3] Six specimens, from Lower California, Mexico.
[4] One specimen, from Lower California.

Type-locality.—Espiritu Santo Island, Lower California, Mexico.

Geographical distribution.—Upper Tropical Zone of southern Lower California, Mexico; south to San Jose del Cabo; north to San Jose Island. Probably resident throughout the year.

The present recently described form is easily separable from all the North American races, and seems most closely to resemble *Ardea herodias cognata* Bangs, from the Galapagos Islands. It may be distinguished from *Ardea herodias adoxa*, of the West Indies, by its much greater size throughout, and paler neck and upper parts; from *Ardea herodias wardi* by smaller size and more lightly colored neck. A bird taken in February is just as pale on neck and mantle as breeding specimens obtained in June. This race has a very limited distribution, the most limited, with possibly one exception, of any form of the group.

Seven specimens have been available, from the following localities, an asterisk indicating a breeding record:

Lower California.—Espiritu Santo Island;* San Jose del Cabo.

Measurements of specimens of Ardea herodias sanctilucae.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm	mm	mm	mm	mm	mm
U.S.N.M. 33134[1]	Male....	San Jose del Cabo, Lower California, Mex.	Feb. —, 1860	J. Xantus de Vesey.	489	195	147	28	177	106
J.E.Thayer 18303[1]	...do....	Espiritu Santo Island Lower California, Mex.[2]	June 13, 1910	W.W.Brown, jr.	500	195	147	28.5	193	114
J.E.Thayer 18305[1]	...do....	.....do.....	June 14, 1910	.....do.....	498	190	151	29	192	112
J.E.Thayer 18304[1]	...do....	.....do.....	June 15, 1910	.....do.....	475	186	154	30	187.5	111
J.E.Thayer 18302[1]	...do....	.....do.....	June 16, 1910	.....do.....	475	183	148.5	29	197	114
J.E.Thayer 18301[1]	...do....	.....do.....	June 18, 1910	.....do.....	476	179	157	30.5	191	115
J.E.Thayer 18306[1]	Female..	.....do.....	June 17, 1910	.....do.....	455	175	132	26.5	169.5	99

ARDEA HERODIAS COGNATA Bangs.

Ardea herodias cognata BANGS, Proc. New Engl. Zool. Club, vol. 3, February 6, 1903, p. 100 (Indefatigable Island, Galapagos Islands).

Chars. subsp.—Similar to *Ardea herodias sanctilucae*, but wing and tarsus shorter, and bill thicker.

Measurements.—Probable male:[3] Wing, 477 mm.; tail, 192; exposed culmen, 159; height of bill at base, 32.5; tarsus, 174; middle toe, 114.

Probable female:[4] Wing, 430–450 (440); tail, 171–172 (171.5); exposed culmen, 139–145 (139.5); height of bill at base, 29–30

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Type-locality.—Indefatigable Island, Galapagos Islands.

Geographical distribution.—Galapagos Islands: Indefatigable, Duncan, Albemarle, and probably other islands of the archipelago. Doubtless permanently resident.

Notwithstanding its far isolated range, this subspecies much more closely resembles the pale races of North America and the West Indies than it does the very dark form of Mexico and Central America. It differs from *Ardea herodias treganzai* in paler neck, stouter bill, and shorter tarsus; from *Ardea herodias wardi* in lighter neck, stouter bill, and shorter wing and tarsus.

One of the specimens examined (No. 116138, U.S.N.M., Duncan Island) is not fully adult and is more brownish, somewhat darker above than the two adults. This race is doubtless peculiar to the Galapagos Archipelago, and probably occurs on many of the islands.

Only three examples have been seen, from the following localities, breeding records being distinguished by an asterisk:

Galapagos Islands.—Indefatigable Island; Duncan Island;* Albemarle Island.*

Measurements of specimens of Ardea herodias cognata.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm	mm	mm	mm	mm	mm
U.S.N.M. 189021[1]	[Male] ..	Albemarle Island, Galapagos Islands.[2]	Apr. 4, 1902	R. H. Beck.	477	192	159	32.5	174	114
U.S.N.M. 116138[1]	[Female]	Duncan Island, Galapagos Islands.	Apr. 13, 1888	.....	450	171	145	30	160	101
A.E. and O. Bangs, 12451.[1]	...do....	Indefatigable Island, Galapagos Islands.[2]	Feb. 16, 1901	R. H. Beck.	430	172	132	29	152	97

[1] Used in measurement averages on p. 549. [2] Type.

ARDEA HERODIAS HYPERONCA, new subspecies.

Chars. subsp.—Like *Ardea herodias herodias* in color, but in size decidedly greater throughout.

Description.—Type, adult male, No. 98486, U.S.N.M.; Baird, California, March 3, 1884; Charles H. Townsend. Sides of crown and long, slender, pointed occipital crest, black; forehead, center of crown, short vertical crest, superciliary stripe, malar region, cheeks, chin, and middle of upper throat, white; neck all around very deep drab gray, somewhat lighter anteriorly, the middle line of foreneck streaked with black, white, and cinnamon rufous; upper sur-

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face, including tail, tertials, innermost secondaries, and superior secondary coverts, slate-gray, the long, narrow, plumaceous feathers of back and scapulars paler and glaucous, the median coverts and outer webs of greater coverts paler gray, the rectrices more slaty on terminal portions; primaries, secondaries (except the innermost), primary coverts, and alula, blackish slate, slate black or dull black; jugulum deep smoke gray, medially white, streaked broadly with black and dull brownish slate, narrowly with cinnamon rufous and pale cinnamon, the long, narrow, pointed, plume-like feathers terminally pale drab gray, smoke gray, or whitish; a tuft of black, partly white-striped feathers on each side of the breast; back of this a small patch of cinnamon rufous; sides and flanks slate gray; breast and abdomen black, broadly streaked with white; under tail-coverts white; thighs and edge of wing deep cinnamon rufous, the latter in part more deeply colored, verging to chestnut; under wing-coverts slate color; axillars slate gray.

Measurements.—Male:[1] Wing, 488–511 (average, 497.0) mm.; tail, 179–195 (186.5); exposed culmen, 139–148 (144.6); height of bill at base, 27.6–32 (29.5); tarsus, 180–198 (188.3); middle toe, 109–119 (112.4).

Female:[2] Wing, 460–492 (473.0); tail, 171–180.5 (175.5); exposed culmen, 135–140 (137.7); height of bill at base, 25–29 (26.5); tarsus, 165–180 (170.3); middle toe, 94–109.6 (100.5).

Type-locality.—Baird, northern California.

Geographical distribution.—Pacific coast region of the United States, mainly in the Upper Austral and Transition zones: north to western Oregon; south to San Diego, southwestern California; east to San Gabriel, western California, and Baird, central northern California. Apparently a permanent resident throughout most if not all of its range, but wanders in winter west to the Farallon Islands, California, and east to St. John, Glenn County, California.

This new race differs much more from all the subspecies of *Ardea herodias* that are geographically near than it does from the far-distant typical form of the species. It may readily be distinguished from *Ardea herodias treganzai* by larger size and darker neck and upper parts, from *Ardea herodias sanctilucae* by much darker neck and mantle and average longer wing. There does not seem to be any constant difference in color between *Ardea herodias hyperonca* and *Ardea herodias herodias*, but the substantial difference in size serves well enough to separate them.

Two specimens from San Diego, California, taken respectively December 16, 1892 (No. 37088, Acad. Nat. Sci. Phila.), and April 24, 1862 (No. 4494, Mus. Vert. Zool.[3]), the latter apparently in the breeding

[1] Six specimens, from California.
[2] Three specimens, from California and Oregon.
[3] Not seen by the writer, but compared by Mr. Joseph Grinnell.

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season, are, in both size and color, essentially like other examples of the present form from northern California, although the first-mentioned bird is slightly paler, as would be natural from an area so near the range of *Ardea herodias treganzai*.

An immature winter example from St. John, Glenn County, California (No. 197862, U.S.N.M.), taken January 2, 1906, belongs apparently to this form; and the breeding bird of the whole Sacramento Valley may be the same. Two specimens collected by the United States exploring expedition under Captain Wilkes (Nos. 12670 and 15352, U.S.N.M.) and labeled simply "Oregon" must be referred to the present form, although rather darker above than birds from northern California. They are somewhat vergent toward *Ardea herodias fannini*, and probably came from near the mouth of the Columbia River—at least no farther north—since all the great blue herons we have seen from Washington are *Ardea herodias fannini*.

Specimens to the number of eight have been seen, from the localities given below:

California.—Humboldt Bay; St. John; San Diego; Baird; San Gabriel.

Oregon.—[No further locality specified.]

Measurements of specimens of Ardea herodias hyperonca.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm.	mm.	mm.	mm.	mm.	mm.
A.N.S.Phila.37088[1].	Male....	San Diego, Cal.	Dec. 16, 1892	C. H. Marsh.	488	192	146	28.5	185	109
Mus. Vert. Zool. 18855.[1]	...do....	Monterey Bay, Cal.[2]	Sept. 12, 1910	R. H. Beck..	497	180	147	30.5	193	113.2
Mus. Vert. Zool. 17244.[1]	...do.....	Suisun Marshes, Solano Co., Cal.[2]	Dec. 28, 1910	E. H. Cuthbert.	511	195	139	28.5	180	111.3
Mus. Vert. Zool. 17243.[1]	...do.....	.....do.[2].....	Dec. 5, 1910	L. Kellogg..	496	180	146	27.6	182	111.8
U.S.N.M. 107401[1].	[Male]...	Humboldt Bay, Cal.	Dec. 7, 1885	C. H. Townsend.	490	179	148	32	198	119
U.S.N.M. 96486[1]...	...do.....	Baird, Cal.[3].	Mar. 3, 1884	.....do.....	500	193	141.5	30	192	110
U.S.N.M. 197862...	Male, juv.[4]	St. John, Glenn Co., Cal.	Jan. 21, 1906	J. H. Gaut..	467	179	156	28.5	195	115
Mus. Vert. Zool. 4494.[1]	Female..	San Diego, Cal.[2]	Apr. 24, 1862	J. G. Cooper.	492	175	138	25.4	180	109.6
Am. Mus. N. H. 49448.[1]	Female, juv.	San Gabriel, Cal.[2]	Sept. 13, 1888	E. C. Thurber.	460	180.5	135	25	165	98
U.S.N.M. 12670[1]...	[Female].	Oregon.....	.....	.....	467	171	140	29	166	94
U.S.N.M 15352....	.....	.....do.....	.....	T. R. Peale.	479	182	146	28	177	104
U.S.N.M. 95116....	.....	Baird, Cal...	Nov. 1, 1883	C. H. Townsend.	.....	204	135	26.5	171	108

[1] Used in measurement averages on p. 551.

[2] Not seen; measured by Mr. Joseph Grinnell.

[3] Type.

[4] Probably a female.

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ARDEA HERODIAS OLIGISTA, new subspecies.

Chars. subsp.—In color like *Ardea herodias hyperonca*, but length of wing very much less, bill more slender, and middle toe shorter.

Description.—Type, almost adult male, No. 135573, U.S.N.M.; San Clemente Island, California, August 26, 1894; Dr. Edgar A. Mearns. Sides of crown, and occipital crest, black; center of crown, vertical crest, malar region, chin, and middle of upper throat, white; sides of head drab-gray; neck all around deep smoke gray, the middle line of foreneck streaked with black, white, and cinnamon rufous; upper surface, including tail, tertials, innermost secondaries, and superior secondary coverts, slate gray, rather darker on middle of back, the median coverts and outer webs of most of greater coverts paler gray, the rectrices terminally inclining to slate color or blackish slate; primaries, secondaries (except the innermost), primary coverts, and alula, blackish slate, slate black or dull black; jugulum smoke gray, medially white, streaked broadly with deep smoke gray and slate color, anteriorly washed with cinnamon rufous, the long, narrow, pointed, plume-like feathers terminally pale gray or whitish; a tuft of black, partly white-striped feathers on each side of the breast; back of this a patch of cinnamon rufous; sides and flanks slate gray; breast and abdomen striped, black, slate gray, and white; lower tail-coverts white; thighs and edge of wing cinnamon rufous, the latter darker along secondaries, somewhat mixed with white at base of primaries; under wing-coverts slate color, with some edgings of chestnut; axillars slate gray.

Measurements.—Male:[1] Total length (in flesh), 1160 mm.; wing, 433; tail, 187; exposed culmen, 149; height of bill at base, 26; tarsus, 184; middle toe, 101.

Type-locality.—San Clemente Island, Santa Barbara Islands, California.

Geographical distribution.—Upper Austral Zone on the Santa Barbara Islands, California: San Clemente Island; also Santa Cruz, San Nicholas, Anacapa, Santa Catalina, and probably other islands of the group. Apparently a permanent resident.

Although the type is the only specimen, it is so very much smaller than any example of the mainland form, *Ardea herodias hyperonca*, that it seemingly can not belong to the same race. It has a shorter wing than even *Ardea herodias herodias*. From *Ardea herodias treganzai* and *Ardea herodias sanctilucae* it differs in much shorter wing and darker neck and mantle.

The type-specimen, though evidently full grown, is not quite adult in color of plumage, which it shows in its brown forehead and fore part of crown; in duller gray and in slight ochraceous admixture

[1] One specimen, the type, from San Clemente Island, California.

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on neck; some grayish in the tufts on each side of the breast, and on feathers of breast and abdomen; and the not fully developed long, narrow, plumaceous feathers of back and scapulars.

This race is probably confined to the Santa Barbara Islands, as the species is said to be resident there. Mr. G. Willett writes [1] that the great blue heron occurs and doubtless breeds in isolated pairs on most, if not all of these islands, but that he has actually seen nests on only Santa Catalina and Anacapa islands. Although, of course, we know certainly of the subspecific status of only the bird on San Clemente Island, yet the published records of the great blue heron from Santa Catalina, Santa Cruz, and San Nicholas islands belong without much doubt under this form.

ARDEA HERODIAS FANNINI Chapman.

Ardea herodias fannini CHAPMAN, Bull. Amer. Mus. Nat. Hist., vol. 14, April 15, 1901, p. 87 (Skidegate, Graham Island, Queen Charlotte Islands, British Columbia).

Chars. subsp.—Similar to *Ardea herodias hyperonca*, but wing, exposed culmen, and middle toe shorter, the tarsus still more so; tail longer; upper parts and neck darker.

Measurements.—Male:[2] Wing, 472–492 (average, 480.7) mm.; tail, 192–195 (193.7); exposed culmen, 124.5–137 (132.8); height of bill at base, 27–28 (27.3); tarsus, 153–167.5 (160.2); middle toe, 97–107 (100.7).

Female:[3] Wing, 456–486 (466.3); tail, 186–194 (189); exposed culmen, 123–129.5 (126.8); height of bill at base, 24.5–26 (25.5); tarsus, 146–158 (153); middle toe, 88.5–96 (93.2).

Type-locality.—Skidegate, Graham Island, Queen Charlotte Islands, British Columbia.

Geographical distribution.—Pacific coast region of northern North America, mostly in the Transition and Canadian zones: north to Hope, Cook Inlet, Alaska; south to Cape Flattery, northwestern Washington; and the Nisqually Flats, central western Washington. Permanently resident, except perhaps in the northernmost part of its range.

This dark northwestern race is readily separable from *Ardea herodias herodias* by its longer wing and tail, decidedly shorter tarsus, average shorter culmen, much darker neck and upper parts. It is so very different from *Ardea herodias treganzai*, by reason of its longer wing and tail, shorter tarsus, middle toe, and culmen, and very much darker neck and upper parts, that close comparison is unnecessary. The very short tarsus of this subspecies, actually as well as relatively, distinguishes it from all the other forms of the species.

[1] In letter.

[2] Three specimens, from Washington and British Columbia.

[3] Three specimens, from Alaska and British Columbia.

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An immature specimen from Admiralty Island, Alaska (No. 187748, U.S.N.M.), is very dark on neck and back, but this difference is apparently not more than individual. This race is confined, so far as known, to a narrow strip of country along the coast and to the islands, from the State of Washington to Alaska.

Ten specimens have been examined, from the subjoined localities, breeding records being followed by an asterisk:

Alaska.—Admiralty Island.

British Columbia.—Sumas (Feb. 1); Sooke Lake; Skidegate, Graham Island (Queen Charlotte Islands); Victoria.

Washington.—Cape Flattery; Nisqually Flats.*

Measurements of specimens of Ardea herodias fannini.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm.	mm.	mm.	mm.	mm.	mm.
A.N.S.Phila. 30616[1]	Male....	Nisqually Flats, Wash.	Apr. 19, 1892	S. N. Rhoads.	492	194	137	28	167.5	97
Am. Mus. N. H., 73572.[1]	...do....	Sooke Lake, B. C.	Mar. 26, 1900	.....	478	192	137	27	153	98
A. E. and O. Bangs, 11158.[1]	...do....	Sumas, B. C	Mar. 22, 1903	A. C. Brooks.	472	195	124.5	27	160	107
U.S.N.M. 187748[1]..	Female, juv.	Near Killisnoo, Admiralty Island, Alaska.	Sept. 25, 1903	W. H. Osgood.	486	194	128	24.5	155	96
A. E. and O. Bangs, 11159.[1]	Female.	Sumas, B. C.	Feb. 1, 1895	A. C. Brooks.	457	187	129.5	26	158	95
Am. Mus. N. H. 74294.[1]	[Female]	Skidegate, Queen Charlotte Islands, B. C.[2]	Feb. —, 1901	J. R. Swanton.	458	186	123	26	146	88.5
U.S.N.M. 4524.....	.....	Cape Flattery, Wash.	.....	W. P. Trowbridge.	474	190	122	26	149	91
J. Dwight 9879....	.....	Victoria, B.C.	.....	.....	472	189	126	27.5	160	91

ARDEA HERODIAS LESSONII Wagler.

Ardea lessonii WAGLER, Isis, 1831, p. 531 (Mexico).

Chars. subsp.—Resembling *Ardea herodias fannini*, but wing and tail shorter; exposed culmen, middle toe, and especially tarsus, longer; upper parts and neck a little lighter in color.

Measurements.—Male:[3] Wing, 470–475 (average, 471.8) mm.; tail, 174–187 (181.3); exposed culmen, 138–154 (146); height of bill at base, 30–31 (30.3); tarsus, 185–191 (188.5); middle toe, 101–113 (108.3).

Female:[4] Wing, 441–464 (455.7); tail, 173–182 (177); exposed culmen, 111–138 (125.7); height of bill at base, 23–27.5 (25.7); tarsus, 157–178 (166.3); middle toe, 93–111 (100).

[1] Used in measurement averages on p. 554.

[2] Type.

[3] Four specimens, from the States of Jalisco and Michoacan, Mexico, and from Panama.

[4] Three specimens, two from the Mexican States of Mexico and Chihuahua, and one from "Mexico."

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Type-locality.—Valley of Mexico, State of Mexico, Mexico.[1]

Geographical distribution.—Mexico, Central America, and northern South America, breeding in the Upper Austral, Lower Austral, Upper Tropical, and Lower Tropical zones: north to southern Sinaloa; Colonia Garcia, northwestern Chihuahua; and Tamaulipas; southeast through all of Mexico to Guatemala, Nicaragua, Costa Rica, Panama, and Merida, Venezuela. Resident all the year practically throughout its range, except perhaps in South America.

From *Ardea herodias hyperonca* the present subspecies may be distinguished by its shorter wing, darker neck and upper parts; from *Ardea herodias herodias* by longer wing and tail and darker neck and upper surface. The young in first plumage are like those of *Ardea herodias fannini*, but are somewhat lighter on neck and upper parts.

A single adult from Chihuahua City, Chihuahua, Mexico (No. 187287, U.S.N.M.), taken February 22, 1904, inclines very little toward *Ardea herodias treganzai;* and a juvenal from Tamaulipas, exact locality unknown (No. 30477, Acad. Nat. Sci. Phila.), appears also to be *A. h. lessonii.* Specimens examined from Nicaragua and Costa Rica are all in juvenal plumage, and without adults it is difficult to place them with certainty. They are no darker than juvenal *Ardea herodias herodias*, and might suggest the existence of another race in this region, were it not that a juvenal of typical *Ardea herodias lessonii*, from Patzcuaro, Michoacan, Mexico, is precisely the same in color. It may be, therefore, that the *young* of *Ardea herodias lessonii* is not darker than the same age of *Ardea herodias herodias*, although the adult is decidedly so. At any rate, until more satisfactory material is available, the bird of Central America down to Costa Rica, inclusive, must pass as *Ardea herodias lessonii.*

A single bird in juvenal plumage from Empire, in the Canal Zone, Panama, is practically identical with young birds from Mexico, Nicaragua, and Costa Rica, except for being rather darker, more slaty, on the neck. Another bird, from Panama is, however, darker above than any adult specimen of *Ardea herodias lessonii* that we have seen; and with more material, the Panama bird may be separable subspecifically from that of Mexico. Since the above-mentioned example is in rather an interesting phase of plumage, almost adult, and very much more brownish than either young or adult normally are, the following description may be of interest:

Almost adult male, No. 230144, U.S.N.M., Biological Survey collection; Fort Lorenzo, Panama, June 21, 1911; E. A. Goldman. Forehead and sides of sinciput clove brown; sides of crown, and occipital crest, black; superciliary stripe pale gray; center of crown, vertical crest, postocular region, malar region, chin and middle of upper throat, white; subauricular region and sides of throat light

[1] Thus here restricted for the sake of definiteness.

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brownish gray; neck all around deep brownish gray, somewhat paler anteriorly, the median line of foreneck streaked with black, clove brown, cinnamon rufous, and white; upper surface, including tail, tertials, innermost secondaries, and superior secondary coverts, slaty brown, the middle of back darker, the median coverts and outer webs of greater coverts lighter; primaries, secondaries (except the innermost), primary coverts, and alula, brownish slate black; jugulum deep brownish gray, medially white, broadly streaked with blackish slate, slate gray, and smoke gray, narrowly with chestnut and cinnamon, the long, narrow, pointed, plume-like feathers terminally white; a tuft of brownish black, mostly white-striped, chestnut-streaked feathers on each side of the breast; back of this a small patch of deep cinnamon rufous; sides and flanks brownish slate; breast and abdomen white, broadly streaked with slate black and slate gray, narrowly with chestnut and cinnamon rufous; lower tail-coverts white; thighs and edge of wing cinnamon rufous, the latter partly mixed with white; lining of wing, including axillars, slate color, but some of the coverts with chestnut edgings.

It thus differs from the fully adult bird in its brownish forehead and sides of sinciput; deep brownish neck and upper parts; rusty edgings of upper wing-coverts; much mixture of white in the edge of the wing; slaty tufts on the sides of the breast; mostly gray breast and abdomen; and the imperfect development of the dorsal, scapular, and jugular plumaceous feathers.

From the date of capture of the previously mentioned Chihuahua example, and from other winter dates given in the list of specimens below, it is evident that the present race is resident throughout the year over most if not all of its range.

The subspecific name which is here applied has been entirely lost sight of for many years, and the writer is indebted to Mr. Ridgway for calling his attention to this long-forgotten description. This *Ardea lessonii* of Wagler[1] is based on a great blue heron from "Mexico," and there is no reasonable doubt concerning its proper application to the present form.

Twelve examples of this race have been seen, from localities as follows, breeding records being indicated by an asterisk:

Chihuahua.—Colonia Garcia (Feb. 22).

Jalisco.—Ocotlan (Dec. 28); La Barca (Dec. 18).

Mexico (*State*).—San Mateo (Dec. 9).

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Measurements of specimens of Ardea herodias lessonii.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe.
					mm	mm	mm	mm	mm	mm
U.S.N.M. 187291 [1].	Male....	La Barca, Jalisco, Mex.	Dec. 18, 1903	E. W. Nelson and E.A.Goldman.	470	184	138	30	198	101
U.S.N.M. 184943 [1].	...do....	Ocotlan, Jalisco, Mex.	Dec. 28, 1902	.....do.....	472	187	143	30	190	109
U.S.N.M. 193839 [1].	Male, juv.	Patscuaro, Michoacan, Mex.	July 15, 1904	.....do.....	475	180	154	31	185	113
U.S.N.M. 66344 [2]..	...do....	Lipurio, Costa Rica.	.....	W. M. Gabb.	435	165	128	25	166	101
U.S.N.M. 230144 [1].	Male, vix ad.	Fort Lorenzo, Panama.	June 21, 1911	E. A. Goldman.	470	174	149	30	191	110
U.S.N.M. 187287 [1].	Female .	Colonia Garcia, Chihuahua, Mex.	Feb. 22, 1904	J. H. Gaut..	462	182	128	27.5	178	111
U.S.N.M. 8065 [1]....	[Female]	Mexico.....	.....	.....	441	173	111	23	157	93
M.C.Z. 56889 [1].....	Female .	San Mateo, Mexico, Mex.	Dec. 9, 1910	W.W.Brown, jr.	464	176	138	26.5	164	96
A.N.S.Phila. 30477	Juv.....	Tamaulipas, Mex.	.....	L. B. Couch.	449	173	130.5	26.5	169	97.5
A. E. and O. Bangs 16381.	.....	Costa Rica..	.....	C. F. Underwood.	462	171	139.5	26.5	181	103
U.S.N.M. 89783....	Juv.....	San Juan del Sur, Nicaragua.	Jan. 5, 1883	C. C. Nutting.	445	179	140	26.5	175	98

[1] Used in measurement averages on p. 555.

[2] Evidently not full grown.

KEY TO THE SUBSPECIES OF ARDEA HERODIAS.

a. Colors very dark; general tone of mantle slate color or deep brownish slate.
  b. Tarsus shorter (that of male less than 170 mm.).....*Ardea herodias fannini*.
  b[1]. Tarsus longer (that of male more than 170 mm.).....*Ardea herodias lessonii*.
a[1]. Colors not very dark; general tone of mantle slate gray or lighter.
  b. Wing of male averaging more than 480 mm.
    c. Upper parts darker; mantle slate gray.....*Ardea herodias hyperonca*.
    c[1]. Upper parts paler; mantle lighter gray.
      d. Smaller (tarsus of male less than 200 mm.; wing of male averaging less than 490 mm.); neck paler.....*Ardea herodias sanctilucae*.
      d[1]. Larger (tarsus of male usually more than 200 mm.; wing of male averaging more than 490 mm.); neck darker.....*Ardea herodias wardi*.
  b[1]. Wing of male averaging less than 480 mm.
    c. Upper surface lighter.
      d. Neck paler; bill heavier (height at base usually not less than 29 mm.). *Ardea herodias cognata*.
      d[1]. Neck darker; bill more slender (height at base usually less than 29 mm.). *Ardea herodias treganzai*.
    c[1]. Upper surface darker.
      d. Smaller (wing of male less than 440 mm.).....*Ardea herodias oligista*.
      d[1]. Larger (wing of male more than 440 mm.).
        e. Mantle lighter; size somewhat smaller (wing of female averaging less than 445 mm.).....*Ardea herodias adoxa*.
        e[1]. Mantle darker; size somewhat larger (wing of female averaging more than 445 mm.).....*Ardea herodias herodias*.

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Table of comparative measurements of the subspecies of Ardea herodias.

MALES.

No. of specimens.	Name of subspecies.	Wing.			Tail.			Exposed culmen.			Height of bill at base.			Tarsus.			Middle toe.		
		Minimum.	Maximum.	Average.	Minimum.	Maximum.	Average.	Minimum.	Maximum.	Average.	Minimum.	Maximum.	Average.	Minimum.	Maximum.	Average.	Minimum.	Maximum.	Average.
		mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
10	*Ardea herodias herodias*	441	480	462.7	167	187	176.6	123	151.5	139.5	23.5	31.3	27.6	167	205	183.6	93	114.5	106.5
14	*Ardea herodias wardi*	496	518	497.7	181	209	191.5	146	167	156.9	28.5	32	30.8	195	232	210.9	115	129	119.9
3	*Ardea herodias adoza*	460	468	464.7	177	185	180	134	150	143	26.5	28.7	27.7	178	187	181.7	109	113	111.3
14	*Ardea herodias treganzai*	445	493	471.7	162	192	179.9	132	157	144.3	26	31	28	165	193	181.6	99	112.5	105.9
6	*Ardea herodias sanctilucae*	475	500	485.5	179	195	188	147	157	150.8	28	30.5	29.2	177	197	189.6	106	115	112
1	*Ardea herodias cognata*	.....	.....	477	.....	.....	192	.....	.....	159	.....	.....	32.5	.....	.....	174	.....	.....	114
6	*Ardea herodias hyperonca*	488	511	497	179	195	186.5	139	148	144.6	27.6	32	29.5	180	198	188.3	109	119	112.4
1	*Ardea herodias oligista*	.....	.....	433	.....	.....	187	.....	.....	149	.....	.....	26	.....	.....	184	.....	.....	101
3	*Ardea herodias fannini*	472	492	480.7	192	195	193.7	124.5	137	132.8	27	28	27.3	153	167.5	160.2	97	107	100.7
3	*Ardea herodias lessonii*	470	475	471.8	174	187	181.3	138	154	146	30	31	30.3	185	191	188.5	101	113	108.3

FEMALES.

12	*Ardea herodias herodias*	433	471	451.2	159	184	173.7	127	146	137	24.5	28.5	26.7	157	194	175.4	93	115	102.4
7	*Ardea herodias wardi*	471	489	477.2	173	192	181.5	140	147	143.7	27	30.5	28.1	189	214	205.4	111	123	116.2
4	*Ardea herodias adoza*	430	447	440.5	168	172	170.5	121	131	127.8	24	26.5	24.8	162	175	167.5	92	108	102
22	*Ardea herodias treganzai*	440	475	455.5	164	182	174.2	120.5	150	137.2	25	28	26.1	157	183	170.5	89	107.5	100.7
1	*Ardea herodias sanctilucae*	.....	.....	455	.....	.....	175	.....	.....	132	.....	.....	26.5	.....	.....	169.5	.....	.....	99
2	*Ardea herodias cognata*	430	450	440	171	172	171.5	132	145	138.5	29	30	29.5	152	160	156	97	101	99
3	*Ardea herodias hyperonca*	460	492	473	171	180.5	175.5	135	140	137.7	25	29	26.5	165	180	170.3	94	109.6	100.5
...	*Ardea herodias oligista*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	*Ardea herodias fannini*	456	486	466.3	186	194	189	123	129.5	126.8	24.5	26	25.5	146	158	153	88.5	96	93.2
3	*Ardea herodias lessonii*	441	464	455.7	173	182	177	111	138	125.7	23	27.5	25.7	157	178	166.3	98	111	100

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NOTES ON THE OCCURRENCE OF THE CRUSTACEAN ALONOPSIS IN AMERICA, WITH DESCRIPTION OF A NEW SPECIES.

By ALFRED A. DOOLITTLE,
Of the Central High School, Washington, District of Columbia.

The presence of a genus of fresh-water Entomostraca belonging to the order *Cladocera*, the genus *Alonopsis*, does not seem to have been recorded hitherto in America. A species from Wisconsin described as *Alonopsis media* Birge [1] is now regarded as a variety of *Alonopsis latissima* Kurz.[2] *Alonopsis latissima* has been collected in almost all parts of the United States and in South America,[3] as well as in the Eastern Hemisphere, but the species has been removed from the genus *Alonopsis* and the genus *Pseudalona* Sars [3] erected for it. Thus no true *Alonopsis* remains on record for America.

It has, therefore, been a matter of interest to find two species of *Alonopsis* in the course of determining the food of young fishes of New England lakes. While investigating the Entomostracan plankton of Sebago Lake, Maine, under the direction of the United States Bureau of Fisheries, small-mouthed black bass, *Micropterus dolmieu*, 38 to 48 mm. long, when taken from a certain locality were found to have eaten as part of their food two species of this genus, namely, *Alonopsis elongata* Sars on July 25, 1906, July 31, 1906, and August 16, 1908, and also *Alonopsis aureola* on July 25, 1906. This second species is new, and is hereinafter described. Similarly, Dr. W. C. Kendall, of the United States Bureau of Fisheries, in his investigations of the Salmonidæ of Sunapee Lake, New Hampshire, captured a few specimens of the Sunapee golden trout, *Salvelinus aureolus*, 27 and 28 mm. long, on April 23, 1910. These have been examined by the writer for their food, and there appeared also in their stomachs *Alonopsis aureola*.

[1] E. A. Birge. Notes on Cladocera. Transactions of the Wisconsin Academy of Sciences, Arts, and Letters, vol. 4, 1876–1877 (1879).

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These findings of *Alonopsis* are the only ones for this genus in America. *Alonopsis elongata* has been known all over Europe [1] for many years. *Alonopsis aureola* has not been heretofore known. All the specimens found in America of both species are from the alimentary tracts of young fish, by whom they had been seized as food.

All the specimens of the black bass in question were captured around rocks in several feet of water immediately off shore. There was accessible near by, at a distance of 50 to 75 meters, a weedy cove. The food with which *Alonopsis* was associated was predominantly the Entomostraca of the open lake which had risen to the surface at night and spread to the shore. These the young black bass fed upon according to their habits in this lake. There were also a few *Polyphemus pediculus* (Linnæus), which prefer clear water several feet in depth near shore, but may occur anywhere. There was also a good sprinkling of true littoral and hydrophytophilous forms as *Ceriodaphnia reticulata* (Jurine), *Acroperus harpæ* Baird, various species of *Alona*, etc. Therefore the habitat of the two species of *Alonopsis*, as they occur in Sebago Lake, is not indicated precisely.

The golden trout of Sunapee Lake is also a lake species, breeding, so far as known, only on a shoal in mid lake. The young trout referred to had eaten along with *Alonopsis aureola* only *Polyphemus pediculus*, which lives, as mentioned, mainly in littoral waters free from weeds. The trout were taken in such a place, but they had access at 100 meters distance to a weedy brook, or, perhaps, the inhabitants of the weedy brook had access to them. During another season Doctor Kendall took young Sunapee golden trout from this brook. Except for two *Cyclops* the food of this second lot of young trout was insects exclusively, in larval, pupal, and adult stages.

At Sebago Lake the effort to find specimens of *Alonopsis* alive was thorough, but neither around the rocks where the bass were captured nor in the weedy cove could they be found. Neither did the young of other species of fish such as catfish, *Ameiurus nebulosus;* or yellow perch, *Perca flavescens;* chub, *Semotilus bullearis;* or sucker, *Catostomus commersonii*, which frequented the cove, and fed abundantly upon Entomostraca yield any specimens of either species. The chances of finding a species of Entomostraca in the cove, if it occurs there, are so much better than those of finding it off the rocky shore, if it occurs there, that the conjecture is hazarded, that in New England lakes *Alonopsis elongata* and *Alonopsis aureola* may rarely be found, especially in the early morning, in clear littoral waters several feet in depth, under the protection of rocky ledges or banks.

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Family CHYDORIDAE Leach (LYNCEIDAE Baird).

Subfamily CHYDORINA Leach.

ALONOPSIS AUREOLA, new species.

Plates 42, 43.

Female.—Length, 1.9 mm.; height, 0.95 mm. The form (fig. 1) is long and low; upper and lower margins are nearly parallel. The head points forward, and the posterior part of the body is truncated. In general proportions it resembles *Alonopsis elongata* Sars. The upper contour is nearly straight in the body region, but slopes downward more and more abruptly as it approaches the end of the rostrum. The posterior margin reaches to the full height of the dorsal margin, is slightly oblique and straight until it reaches the postero-ventral angle. This lower posterior angle is more strictly to be regarded as cut off at an angle of about 45° with the longitudinal axis of the body, leaving a sinuous margin instead of the usual sharp or rounded angle. Tracing the ventral margin forward, a concave portion bearing short setæ runs to a place slightly anterior to the middle of the body, which is also the place of greatest depth; then changing direction slightly, another portion, also slightly concave and setigerous, runs forward and joins the anterior margin without further peculiarity.

The head (fig. 2) is low, narrow, and pointing forward; the rostrum is short, and from side view is obtuse. There is a slight cervical indentation. The compound eye is quite large, situated remote from the end of the rostrum, and the superior margin. The ocellus, or *macula nigra*, is one-half the diameter of the compound eye, and nearer the end of the rostrum. The labrum has a large obtuse anterior lobe of usual form and a slender horizontal lobe.

The test or shell of the body possesses markings unlike those of other species of *Alonopsis*. Diagonally across the main portion of the test, at an angle of 45°, are fine lines, 30 to the millimeter. Those reaching the ventral margin anterior to the deepest point arrange themselves progressively so as to be parallel with the anterior margin. These lines do not encroach closely upon the cervical region. The skin under the exoskeleton in some cases adds to the markings, dividing the spaces between the diagonal lines into rectangular meshes. Such meshes do not appear in tests from which the skin or epidermis has been removed. In addition to these lines the entire test is covered with fine striæ which occasionally anastomose. The general effect of these lines under high magnification resembles the rows of papillæ in the human palm, and the striæ observed in *Alonella excisa* (Fischer). These striæ run, in general, longitudinal, parallel, in side view, with the upper margin (fig. 3 B). On the top of the head, however, there is more or less of a concentration of these striæ around

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a very distinct keyhole-shaped space, the effect at this place being like that of a cowlick (fig. 3 A).

The first antenna or antennule (fig. 2) is short and thick, equaling or slightly exceeding the rostrum. The terminal olfactory setæ are delicate and equaling the antennule in length. The seta usual in this genus on the posterior border has not been observed; neither is the offset in which it usually stands present. Anteriorly, near the end of the antennule is such an offset, but a seta was not observed. Observations on this point are not conclusive, due, as shown later, to the condition of the material.

The second antenna, or antenna proper (fig. 4), is with 7 swimming setæ, the usual seta upon the first segment of the inner ramus being reduced to a slender seta-like spine; the spines, therefore, 4, resembling *Acroperus*. Setæ 𝄾 𝄽 𝄾, spines 𝄽 𝄾 𝄽. Spines, except as noted, quite strong; setæ segmented.

The mandible is slender and curved.

The maxilla (fig. 5), as in *Camptocercus* and *Acroperus*, with 3 retrorse teeth, the distal one smooth and rudimentary; the proximal two ciliated, quite strong, and sub-equal in size.

The feet are distinctly Lynceid in character. The first two pairs (figs. 6 and 7) are hardly distinguishable from those of *Alonopsis elongata* as figured by Dr. W. Lilljeborg.[1] The third (fig. 8) and fourth (figs. 9 and 10), however, resemble those of *Camptocercus* more closely in the number of setæ and the development of the ctenoid setæ. The fifth and sixth feet, if present, did not come under observation and lack of material prevented adequate search for them.

The postabdomen (fig. 11) is broad and strong, and is not long. The dorsal or spine-bearing margin and the ventral margin are nearly parallel; the former broadly rounded at its end and not produced beyond the claw-bearing extension of the latter. The distal half of the dorsal margin, that is, beyond the anal opening is armed with a double row of 11 small slender spines, slightly larger on the rounded end of the postabdomen. There are no lateral denticles. The claw is upon a fleshy base which has no spinules. The claw itself has a spine at the base and at the middle of its concave border, and between them fine spinules. The distal half of the claw is smooth.

Male.—Unknown.

Color is yellowish-golden.

Occurrence.—The only specimens of this species are from the alimentary tracts of fish by whom they were captured as food. The condition of the specimens was not entirely satisfactory, especially for internal structures. Specimens taken as follows: One specimen from small-mouthed black bass, 31 mm. long, Sebago Lake, Maine,

[1] Cladocera Sueciae, Nova Acta Regiæ Societatis Scientarium Upsaliensis, vol. 19, pl. 65, figs. 11 and 12.

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July 25, 1906; 3 specimens from Sunapee golden trout, 27 and 28 mm. long, Sunapee Lake, New Hampshire, April 23, 1910.

Habitat.—Apparently they live in fresh water lakes in water several feet in depth, off rocky shore.

The specific name refers to the color of the shell, as well as to the specific name of the trout from whom the greater number of specimens and the type were taken.

Type.—Cat. No. 44366, U. S. N. M., from the alimentary tract of *Salvelinus aureolus*, Sunapee Lake, New Hampshire, April 23, 1910.

EXPLANATION OF PLATES.

PLATE 42.

FIG. 1.—*Alonopsis aureola*, female from Sunapee Lake, New Hampshire, April 23, 1910. Specimen No. 1, the type. Side view. × 32.

2.—Specimen No. 2. Head, lateral view. × 75.

3.—Specimen No. 2. A. Shell markings in median line, posterior part of head. × 275. B. Shell markings on side of test. × 275.

4.—Specimen No. 2. Second antenna, or antenna proper: *a*, upper or outer ramus; *b*, lower or inner ramus. × 275.

5.—Specimen No. 3. Maxilla. × 1160.

6.—Specimen No. 3. Left first foot. A. Exterior view. × 275. B. Interior view. × 275.

PLATE 43.

FIG. 7.—*Alonopsis aureola*. Specimen No. 3. Right second foot, outer view. × 275.

8.—Specimen No. 3. Right third foot, inner view. × 275.

9.—Specimen No. 3. Left fourth foot, inner view. × 275.

10.—Same as fig. 9, flattened under cover glass, outer view. × 275.

11.—Specimen No. 1. Postabdomen, lateral view. × 90.

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A NEW GENUS AND SIX NEW SPECIES OF FISHES OF THE FAMILY CYCLOGASTERIDÆ.

By CHARLES VICTOR BURKE,
Of Stanford University, California.

An examination of the Cyclogasteridæ represented in the United States National Museum in Washington and the Museum of Comparative Zoology in Cambridge has revealed the six new species described in the present paper. Certain of these species are represented by specimens in the United States Bureau of Fisheries and the Stanford University Zoological Museum. The types of five of the species have been selected from among the specimens in the United States National Museum. The remaining species, *Rhinoliparis attenuatus*, is represented by a single specimen and this is deposited in the Museum of Comparative Zoology.

The opportunity is taken here to present also the description of a new genus. This genus, *Polypera*, is based upon the number of pyloric cæca, a character heretofore not utilized in distinguishing the genera and species of the family. The genus *Polypera* is formed to include the single species *Neoliparis greeni* Jordan and Starks. This species has about 300 pyloric cæca. As none of the other species of the family have as many as 100 pyloric cæca it seems advisable to recognize this great difference in the number of pyloric cæca as of generic importance.

POLYPERA, new genus.

Disk large; dorsal fin notched; nostrils, 2; teeth weakly trilobed and simple; pyloric cæca numerous, more than 200; branchiostegals, 6.

The genus *Polypera* differs from *Cyclogaster* solely in the number of pyloric cæca. None of the 30 species of the latter genus has as many as 100 pyloric cæca. The pyloric cæca in *Polypera* are matted closely together and can be distinguished without counting from those of any of the species of *Cyclogaster*. The dentition in *Polypera* is distinct from that found in any of the species of *Cyclogaster* in which the dorsal fin is notched and supplements the difference found

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in the pyloric cæca in support of the view that in *Polypera* we are dealing with an aberrant line of development. The larger teeth in *Polypera greeni* are simple or have the lateral lobes but faintly indicated. The nearest approach to this type of dentition found among the species of *Cyclogaster* is in *Cyclogaster major* (Gill). In this species some of the larger teeth are simple, but in other characters the species is so widely divergent from *Polypera greeni* that we are led to believe that the similarity in dentition is due to parallel development.

Type of the genus.—*Polypera greeni* [1] (Jordan and Starks).

CYCLOGASTER BRISTOLENSE Burke, new species.

Liparis agassizii GILBERT, Rept. U. S. Fish Comm., 1893, 1896, p. 446.

Type.—Female, Cat. No. 53790, U.S.N.M. Vicinity of Bristol Bay, Bering Sea; *Albatross* station 3514.

Distribution.—Southeastern Bering Sea, *Albatross* stations 3247, 3301, 3514, 3518; depth, 17 to 36 fathoms.

Relationships.—The distribution, shape of body, and the presence of prickles suggest a close relationship between *Cyclogaster bristolense* and *Cyclogaster megacephalus*. The latter species, however, appears to be distinct in having a larger number of dorsal rays, a larger gill-slit, and the dorsal notch entirely absent. *Cyclogaster bristolense* differs from *Cyclogaster tunicatus* and *Cyclogaster herschelinus* in the smaller number of dorsal rays, the coloration, and the presence of prickles. It differs from *Cyclogaster agassizii* in the smaller number of dorsal rays and pyloric cæca, the coloration, the presence of prickles, and the smaller gill-slit.

Description of type.—Dorsal, 38; anal, 32; pectoral, 35. Depth, 4.3 in length of body; head, 3.7. Eye, 4 in head; disk, 1.8.

Body robust, deepest at front of first dorsal. Head moderate; cheeks slightly swollen; width of head a little greater than depth of head; profile depressed over the eyes; occiput swollen. Mouth broad; maxillary reaching vertical from pupil. Teeth trilobed, stout, arranged in about 9 oblique rows in the half of each jaw. Snout short, rather deep; nasal region strongly convex. Anterior nostril in a short tube; posterior nostril without tube. Eye moderate; the lower half silvery. Gill-slit extending down in front of the two upper pectoral rays. "Thumb-tack" prickles present in all the specimens, scattered thickly over the top of the head and sparsely along the sides of the body. Pyloric cæca few, not counted in the type, varying from 16 to 22 in the other specimens.

Dorsal fin with a shallow notch, the fifth and sixth rays being slightly shortened. Caudal slightly rounded, connected to the dorsal for two-fifths its length: the anal connection a little greater; a

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anal. Pectoral notched; the lower lobe of 7 rays, reaching slightly past the disk. Disk large, less than 2 in the head, nearly round and with a broad flap. Vent separated from disk by two-thirds diameter of disk.

Body grayish; large, irregular brown blotches on head and body, these extending on dorsal and anal fins; caudal with a broad bar near the base; lower jaw with 3 bars on each side; peritoneum with scattered black dots.

Remarks.—The anterior 5 or 6 dorsal rays usually are set off by a shallow notch; sometimes the 3–4–5–6 rays are equal, but they never increase regularly in length. The notch between the dorsal and caudal is either present or absent. The connection between the caudal and the dorsal is normally greater than one-fifth the length of the caudal; in one cotype it was just one-fifth the length of the caudal. All the specimens have "thumb-tack" prickles. The coloration is of two types; (1) that described for the type, (2) body grayish or olive brown; dorsal and anal mottled and barred with brown; pectoral speckled with brown; caudal with a broad bar near the base.

Specimens examined.

Museum No.	Specimens.	Locality.	Collector.
53790, U.S.N.M.	1	Station 3514	*Albatross.*
64115, U.S.N.M.	1	do	Do.
48583, U.S.N.M.	1	Station 3301	Do.
34114, U.S.N.M.	2	Station 3518	Do.
3070, S.U.Z.M.	7	Station 3247	Do.

CYCLOGASTER MEGACEPHALUS Burke, new species.

Type.—Female, Cat. No. 53791, U.S.N.M. Southeastern Bering Sea, *Albatross* station 3519; depth, 37 fathoms.

Distribution.—Southeastern Bering Sea, *Albatross* stations 3518, 3519, 3520; depth, 36 to 38 fathoms.

Relationships. — *Cyclogaster megacephalus* resembles *Cyclogaster major* in the heavy head and body, but is otherwise distinct. It can readily be distinguished from *Cyclogaster gibbus* and related species by the heavy head and body. For a comparison with *Cyclogaster bristolense* see description of the latter species.

Description of type.—Dorsal, 43; anal, 36; pectoral, 36; pyloric cæca, 29. Depth, 3.7 in the length; head, 3.6. Eye, 5.8 in the head; disk, 2.

Body heavy anteriorly, deep and broad, deepest at the origin of the dorsal fin, tapering rapidly to the base of the caudal, much compressed posteriorly. Head heavy, short, about as wide as deep;

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Snout short, broad and deep; jaws about equal. Anterior nostril with a thick tube; posterior nostril with a raised rim. Eye moderate, the lower half silvery. Gill-slit wide, extending down in front of 12 pectoral rays. Thumb-tack prickles absent from the type, present on the cotype.

Dorsal unnotched, the rays increasing gradually in length. Caudal rounded, connected for two-fifths its length to the dorsal; no notch between dorsal and caudal. Pectoral with a shallow notch; the lower lobe short, reaching half way between disk and vent. Disk large, as broad as long; center of disk under gill-slit. Vent separated from disk by two-thirds diameter of disk.

Body grayish, mottled on sides with brown; dorsal and anal mottled and barred with brown; caudal barred with light brown; pectoral speckled; peritoneum silvery with scattered black dots.

Specimens examined.

Museum No.	Specimens.	Locality.	Collector.
53791, U.S.N.M.	1	Station 3519	*Albatross.*
53787, U.S.N.M.	1	Station 3518	Do.
581, U.S.B.F.	1	Station 3520	Do.

CAREPROCTUS GILBERTI Burke, new species.

Careproctus spectrum BEAN, Proc. U. S. Nat. Mus., vol. 13, 1890, p. 40 (in part—confused with the type of *Careproctus spectrum*).

Careproctus colletti EVERMANN and GOLDSBOROUGH, Bull. U. S. Bur. Fish., vol. 26, p. 333; not of Gilbert.

Type.—Cat. No. 64110, U.S.N.M. North of Kodiak Island, Alaska, *Albatross* station 4292; depth, 102 fathoms.

Distribution.—Off British Columbia and southeastern Alaska, *Albatross* stations 2848, 2862, 3480, 4292, 4293, and 4781; depth, 102 to 482 fathoms.

Relationships.—*Careproctus gilberti* closely resembles *Careproctus ostentum*. Specimens of *Careproctus gilberti* were found in the type bottle of *Careproctus spectrum*, indicating that these species also closely resemble each other. We find that *Careproctus gilberti* can be distinguished from *Careproctus ostentum* by the distinctly larger disk and from *Careproctus spectrum* by the smaller disk, wider gill-slit and the darkly colored stomach.

Description of type.—Dorsal, 55; anal, 46; pectoral, 31; pyloric cæca about 10. Depth of body 4 in the length without the caudal; head, 3.6. Eye, 3.5 in the head; disk, 9.

Body short, compressed, tapering rapidly to the caudal fin. Head heavy, deep, compressed; depth of head greater than width of head; interorbital broad and flat; cheeks vertical. Mouth broad; lateral

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lobes absent from some of the teeth, weakly developed on others, appearing absent under the hand lens; inner teeth appearing prominent; the oblique rows practically indistinguishable. Snout low, broadly rounded, not projecting. Nostril in a short, thick tube. Eye large, prominent, the lower half silvery. Gill-slit large, 2.4 in the head, extending down in front of 14 pectoral rays. Prickles absent. Pyloric cæca 10 to 12 in the cotypes.

Anterior dorsal rays increasing gradually in length, not buried in thick pseudotissue. Caudal truncate, connected for half its length to the anal; the rays coiled at the tip. Upper edge of pectoral on a level with a point midway between angle of mouth and eye; the upper lobe consisting of 14 rays; the space between the two lobes bridged by 10 short, widely spaced rays; lower lobe of 7 rays, 1.4 in the length of the head. Disk small, cupped, a little wider than long, 9 in the length of the head. Vent close to the disk, both hidden between the lower lobes of the pectoral fin.

Skin lax, transparent; flesh pinkish; peritoneum silvery; stomach blackish. In some individuals the body is slightly brownish along the back and the peritoneum is dotted.

Specimens examined.

Museum No.	Specimens.	Locality.	Collector.
64110, U.S.N.M.	1	Station 4202	*Albatross.*
64111, U.S.N.M.	1	Station 4203	Do.
64112, U.S.N.M.	21	Station 2848	Do.
53814, U.S.N.M.	2	Station 2862	Do.
53815, U.S.N.M.	1	Station 3480	Do.
45363, U.S.N.M.	1	Station 2848	Do.
48, S.U.Z.M.	3	Station 2848	Do.

PARALIPARIS DEANI Burke, new species.

Paraliparis holomelas EVERMANN and GOLDSBOROUGH, Bull. U. S. Bur. Fish., vol. 26, p. 334 (in part, not of Gilbert).

Type.—Cat. No. 60570, U.S.N.M. Stevens Passage, southeastern Alaska, *Albatross* station 4253; depth, 188 fathoms; length, 68 mm.

Distribution.—Coast of Alaska south of the Alaska Peninsula; *Albatross* stations 4194, 4203, 4251, 4253, 4255, 4292, and 4293; depth, 30 to 274 fathoms.

Relationships.—Paraliparis deani does not appear to be closely related to any known species. It is one of the few species of the genus in which the gill-slit extends down in front of the pectoral fin.

Description of type.—Dorsal, 56; anal, 46; caudal, 4; pectoral, 18; pyloric cæca about 9. Depth, 6 in the length of the body without the caudal; head, 4.5. Eye, 2.8 in the head; gill-slit, 3.

Body deepest at the nape, compressed, rather slender and elongate. Head short, broad; interorbital flat; occiput slightly swollen. Mouth horizontal; maxillary reaching vertical from the posterior third of the eye. Teeth arranged in narrow bands, appearing simple under

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the hand lens but under the microscope the lateral lobes are seen to be weakly developed. Eye large, prominent; pupil large, round. Snout deep, abrupt. Nostril tube little more than a raised rim. Gill-slit wide, extending down in front of 10 pectoral rays. Thumb-tack prickles present on the lower lobe of the pectoral fin; the epidermis is absent from the remainder of the body and may have contained prickles.

Anterior dorsal rays increasing rapidly in length; the anterior ray short, little greater than the diameter of the pupil. Caudal truncate, of 4 rays, connected for nearly half its length to the anal fin. Pectoral fin notched; the rays opposite the notch widely spaced, not rudimentary; the lower lobe of 4 elongate, nearly equal rays, 1.2 in the head, not reaching the anal fin.

Body pale, with scattered brown dots; mouth pale, dusky in the throat; gill cavity dusky; peritoneum silvery, dotted below, dusky above; stomach black.

Remarks.—The remaining specimens examined vary somewhat from the type. The gill-slit extends down in front of from 10 to 13 pectoral rays. The eye varies from silvery to black. The absence of silvery pigment in the eye may be due to the preserving fluid. In the two cotypes, as in the type, the lower lobe of the pectoral fin retains the epidermis in which are found thumb-tack prickles. None of the specimens have prickles scattered over the body. As the epidermis is absent from the bodies of all the specimens prickles may have been present on the sides of the body in life and lost with the epidermis. The caudal fin is either truncate or slightly concave. Specimens No. 60671 differ from the other specimens and may represent another species. They are larger with shorter, deeper bodies and a paler coloration.

Specimens examined.

Museum No.	Specimens.	Locality.	Collector.
60570, U.S.N.M.	1	Station 4253	*Albatross.*
64113 (cotypes), U.S.N.M.	2	do	Do.
60569, U.S.N.M.	1	Station 4194	Do.
60571, U.S.N.M.	1	Station 4253	Do.
60568, U.S.N.M.	1	Station 4203	Do.
60590, U.S.N.M.	1	Station 4293	Do.
60589, U.S.N.M.	1	Station 4255	Do.
60670, U.S.N.M.	5	Station 4251	Do.
60671, U.S.N.M.	9	Station 4293	Do.

PARALIPARIS GARMANI Burke, new species.

Amitra liparina GOODE and BEAN, Oceanic Ichthyology, 1895, p. 278 (in part).

Type.—Cat. No. 64129, U.S.N.M. Off New England, *Albatross* station 2586; depth, 328 fathoms.

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Relationships.—*Paraliparis garmani* does not closely resemble any known species of the North Atlantic Ocean. It has, however, been confused with *Paraliparis liparina* by various writers. It can readily be distinguished from the latter species by the oblique mouth and the more elongate, slender, and recurved teeth. In these two characters *Paraliparis garmani* bears a close resemblance to *Paraliparis cephalus* of the Pacific Ocean. It differs from the latter species, however, in the larger number of pectoral rays and the rudimentary middle pectoral rays.

Description of the type.—Dorsal, 54; anal, 49; pectoral, 21; caudal, 8; pyloric cæca, 6. Depth, 4.6 in the length of the body without the caudal; head, 4.5. Eye, 5.4 in the head; gill-slit, 4.2.

Body deepest at the nape, tapering rapidly for a short distance, not very attentuate, resembling that of *P. copei*. Head heavy, short, compressed; occiput considerably swollen; cheeks vertical; profile concave over the eyes. Mouth oblique as in *P. cephalus*. Teeth simple, rather slender and elongate, distinctly recurved, arranged in broad bands. Snout deep, abrupt; symphysis of lower jaw sharp, projecting. Nostril without projecting tube. Eye small, black. Gill-slit small, extending up from the upper pectoral ray. Prickles absent.

Anterior dorsal rays buried in tissue. Caudal appearing forked, connected for half its length to the anal. Pectoral divided into two distinct lobes; the space between bridged by 4 rudimentary rays hidden beneath the skin; the upper lobe broadly rounded, 2 in the head; the lower lobe of 3 slender rays, 2.9 in the head.

Remarks.—In the young the occiput is greatly swollen as in *P. cephalus* and the tail appears very slender and attenuate in contrast to the heavy head and trunk. The maxillary may extend from beneath the middle of the eye to the posterior margin.

Specimens examined.

Museum No.	Specimens.	Locality.	Collector.
64129, U.S.N.M.	1	Station 2586	*Albatross.*
46013, U.S.N.M.	1	Station 2676	Do.
46004, U.S.N.M.	1	Station 2561	Do.
64130, U.S.N.M.	1	Station 2586	Do.
35562, U.S.N.M.	3	Station 2212	Do.
28786, U.S.N.M.	1	Station 937	*Fish Hawk.*
46005, U.S.N.M.	1	Station 994	Do.
28855, U.S.N.M.	1	Station 952	Do.
31594, U.S.N.M.	1	Station 1093	Do.
28899, U.S.N.M.	3	Station 997	Do.
26739, U.S.N.M.	1	Station 898	Do.

RHINOLIPARIS ATTENUATUS Burke, new species.

Type.—Cat. No. 28377, M.C.Z. Bering Sea, *Albatross* station 3326; depth, 576 fathoms. Only the type-specimen known.

Relationships.—*Rhinoliparis attenuatus* constitutes the second species in the genus. It does not appear to be closely related to

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Rhinoliparis barbulifer and can readily be distinguished from the latter by the larger number of barbels on the snout and the more highly modified type of dentition.

Description of type.—Body as in *R. barbulifer*, low, extremely attenuate. Head, 5.7 in the length of the body without the caudal, depressed; width of head greater than depth of head; profile low, nearly straight from snout to occiput; interorbital flattened. Mouth broad; maxillary reaching vertical from posterior margin of eye. Teeth in narrow bands, elongate, slender, slightly recurved, simple or the lateral lobes faintly indicated on some of the teeth. Snout depressed, broad, projecting as in *R. barbulifer*, extending beyond the upper lip for three-fourths the diameter of the eye. The snout is somewhat mutilated, but at least three barbels are present on each side; one of these is situated near the tip of the snout and two near the lateral margin of the lower surface. Nostril with a raised rim. Eye large, 4 in the head. Gill-slit apparently above the base of the pectoral fin. Pyloric cæca about 12.

Caudal fin mutilated but apparently reduced to a single elongate ray, connected for a short distance with the dorsal and anal fins. Pectoral fin with a shallow notch; the middle rays well developed, widely spaced; the lower lobe of 6 elongate mainly free rays.

The dermis absent, probably dusky or blackish; flesh pinkish; mouth dusky; peritoneum black; stomach pale or slightly dusky.

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DESCRIPTIONS OF ONE NEW FAMILY, EIGHT NEW GENERA, AND THIRTY-THREE NEW SPECIES OF ICHNEUMON-FLIES.

By H. L. Viereck,

Of the Bureau of Entomology, United States Department of Agriculture.

This paper is based chiefly upon material sent for determination to the Bureau of Entomology, United States Department of Agriculture, by economic entomologists. Many of the species treated are likely to become of economic importance.

MYERSIIDÆ, new family.

Related to the Agriotypidæ, from which it differs especially in the Ichneumonid habitus, in the propodeum having a superior and posterior face, in the first abdominal segment not being cylindrical, with the spiracles near the base or before the middle, but depressed, with the spiracles beyond the middle and with an apically dilated postpetiole, and in the character of the abdomen proper, which recalls the corresponding part in the Figitidæ on account of the second and third dorsal segments, constituting most of the abdomen beyond the first segment, the fused second and third dorsal segments overlapping on the ventral surface of the abdomen. Females winged with a scutel or wingless without a scutel. This family is erected for the reception of the following new genera and species:

MYERSIA, new genus.

Type of the genus.—*Myersia laminata*, new species.

Head approximately as long as wide as seen from in front, twice as wide as long antero-posteriorly as seen from above; temples and cheeks receding posteriorly, not attaining the same plane as the outermost outside line of the eyes; occipital carina present, distinct and complete, joining the lower, hind corner of the malar space near the junction of the oral carina with the malar space, above reaching close to the place of the uppermost outside line of the ocelli; face convex, the convexity extending distinctly beyond the foremost outside line of the eyes;

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clypeus rather transversely elliptical, at least twice as wide as long down the middle, not distinctly separated from the face except laterally by reason of the presence of a foramin or fossa on each side between it and the malar space and base of mandibles, convex; mandibles compact, the left one overlapping the right one when flexed, its upper tooth reaching close to the base of the other mandible, its lower tooth distinctly shorter than the upper tooth and less developed; labrum exserted sufficiently to hide the upper edge of the mandible; malar space at least half as long as the eyes, separated from the face by a fine carina or raised line; palpi simple; antennæ simple, 18-jointed; notauli more or less developed on the anterior half of the mesonotum; sternauli wanting; lateral carinæ of mesonotum continued to the middle of the sides of the scutel, the latter ending in a poorly developed carina that is forked at apex; wings essentially as in *Agriotypus* (Walker) Curtis except in the second abscissa of the discoidal vein, which is hardly longer than the third, and in the neither angulated nor broken but vertical nervellus; onychium of hind legs as long as the third tarsal joint, claws simple, empodia well developed, nearly as long as the claws in the hind legs; propodeum areolated, the areola and petiolarea confluent, the areopetiolarea longitudinally concave and extending almost to the base of the propodeum, paracostulæ, or that portion of the apical transverse carina between the median and longitudinal carinæ, produced into a lamina that is directed upward and backward, spiracles of prodeum perfectly round and with a carina between them and the metapleuræ; spiracles of first segment projecting beyond the lateral outside line of the petiole and base of postpetiole; spiracles of the visible segments inconspicuous and round.

Named for Mr. P. R. Myers, who discovered this remarkable species.

MYERSIA LAMINATA, new species.

Type-locality.—Plummers Island, Maryland.

Type.—Cat. No. 15006, U.S.N.M.

Female.—Length 4 mm.; head, thorax, propodeum, and first abdominal segment black or blackish; mandibles, labrum and palpi mostly stramineous; antennæ brownish stramineous, becoming blackish toward tip; scape at least twice as long as thick; pedicel rather globular; joints of the flagel subequal, the first joint distinctly longer than the second and apparently five times as long as thick at base; all joints of the flagel longer than thick except the antepenultimate and penultimate joints which are as long as thick or nearly as long as thick; face rather dull, finely sculptured, clypeus more shining, with a few indefinite punctures; front and vertex finely reticulated, and with scattered small punctures; lateral ocelli as near or a little nearer

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the front, scapulæ smoother; sides of the pronotum and mesopleuræ striated as in the fossa between the mesonotum and scutel and the scutel itself at apex; wings transparent, brownish with dark brown to blackish stigma and veins, tegulæ stramineous; legs, including coxæ and trochanters, tramineous to brownish tramineous; propodeum more or less striate or granular or both, basal area transversely oblong, first and second pleural areæ confluent, third lateral and third pleural areæ confluent; metapleuræ roughened, not carinate; petiole planate, dull, finely sculptured, bounded on each side by a carina that forms the upper boundary of a shallow parallel sided furrow the lower, carinate boundary of which terminates at the spiracles, beyond which it reappears as the lateral margin of the postpetiole, the other carinæ continued on the postpetiole, where they converge and become lost among the striæ of the lateral thirds of the postpetiole; basal half of middle third of postpetiole scupltured like the petiole; rest of postpetiole longitudinally striate; rest of abdomen highly polished, dark brownish and blackish; exserted portion of ovipositor hardly as long as the petiole and brownish stramineous, sheaths of ovipositor attenuated and dark brown.

Labeled, "May 11, 1912, P. R. Myers collector."

THAUMATOTYPIDEA, new genus.

Type of the genus.—Cremnodes tuberculatus Ashmead.

This genus is erected for the wingless species of the Myersiidæ placed in the genus *Thaumatotypus* (Foerster) Brischke by E. H. Strickland.[1]

THAUMATOTYPUS (Foerster) Brischke.

Thaumatotypus FOERSTER, Verh. Naturh. Ver. Preuss. Rheinland, vol. 25, 1868, p. 172. No species.—BRISCHKE, Schrift. Naturf. Ges. Danzig, new ser., vol. 5, 1881, pt. 1, p. 349.

Type of the genus.—Thaumatotypus femoralis Brischke, first species included.

This genus is too briefly described to make its position certain. It may prove to belong to the Myersiidæ.

Family BRACONIDÆ.

BUCCULATRIPLEX, new genus.

Type of the genus.—Bracon bucculatricis Ashmead.

Related to *Heterogamus* Wesmael, from which it differs especially in the *Polystenidea*-like abdomen, there being only four abdominal segments visible dorsally, in the second segment being nearly twice as long as the first and distinctly longer than the following segments

[1] Ann. Ent. Soc. Amer., vol. 5, 1912, pp. 114, 117, 139.

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combined, in the trapezoidal second submarginal cell, in the simple propodeum with a petiolarea and a median longitudinal carina from the latter to the base, and in the faintly impressed sternauli.

CARDIOCHILES NIGRICEPS, new species.

Type-locality.—Savannah, Georgia.

Type.—Cat. No. 15007, U.S.N.M.

Female.—Length 7.4 mm.; head including antennæ and palpi, prescutum, scapulæ, pleuræ, wings, coxæ, trochanters, fore and mid femora, hind tarsi, tips of hind tibiæ and propodeum mostly black or blackish, elsewhere, excepting fore and mid tibiæ and tarsi which are dark brown or blackish, mostly reddish. Related to *C. viator* (Say) and *C. seminigra* (Cresson).

Allotype.—Essentially as in the type.

Labeled, "*Toxoneura nigriceps* Riley. No. 3956°, reared Aug. 10, 1886, from *Chloridea rhexia*, received from Mr. R. S. Barnoll."

A series of female paratypes labeled "Am. Sumatra Tobacco Co.," from Quincy, Florida, shows variation in color, one specimen in particular having the prescutum and scapulæ almost entirely reddish and the mid femora with a reddish stain. These departures from the typical specimens would seem to indicate that this species may prove to be a race of *C. viator* (Say) or *C. seminigra* (Cresson).

CHELONUS (CHELONUS) BUSCKIELLA, new species.

Type-locality.—Montserrat, Trinidad.

Type.—Cat. No. 15008, U.S.N.M.

Male.—Length 3.5 mm.; resembles *Chelonella buscki* Viereck, from which it can be distinguished by the flagel being more than 21-jointed, in the first joint of the flagel being brownish, in the pale portions of the veins being rather stramineous, in the brownish apices of the costa and basal vein, in the stramineous area of the carapace being confined between the outer edge of the carapace and the lateral carinæ and in the presence of a lateral spiracle near the base of the apical third of the carapace, the rim of the spiracle and the adjoining part of the carapace being reddish brown.

Labeled, "Collected June 29, 1905, A. Busck."

Named for Mr. August Busck.

HABROBRACONIDEA, new genus.

Type of genus.—*Habrobraconidea bicoloripes*, new species.

Related to *Habrobracon* (Ashmead) Johnson, from which it may be known by the antennæ being practically as long as the body and filiform, by the second abscissa of the cubitus being distinctly shorter

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HABROBRACONIDEA BICOLORIPES, new species.

Type-locality.—Rainbow, Connecticut.

Type.—Cat. No. 15009, U.S.N.M.

Female.—Length 5 mm.; black and shining; first joint of flagel a little longer than the second, superior and posterior orbits, the latter above, more or less brownish; mesosternum brownish; wings infuscated, second abscissa of radius as long as or a little shorter than the first transverse cubitus and a little longer than the second transverse cubitus; hind coxæ, trochanters and femora reddish; propodeum with a median longitudinal brownish line; median longitudinal embossed area on the second dorsal abdominal segment extending a little beyond the middle, apex of second dorsal segment subemarginate, the false suture between the second and third segments, crenulate; abdomen reddish throughout and mostly polished, the second dorsal segment with a faint carina on the middle of each side; hypopygium sharply pointed and surpassing the pygidium; exserted portion of ovipositor nearly as long as the body.

Labeled, "No. 325, June 25, 1910, S. N. Spring." A paratopotype measures 3.5 mm. in length. The paratypes indicate that the sculpture of the second dorsal abdominal segment is subject to variation and that the basal embossed area on the third dorsal segment may be poorly developed or virtually wanting.

MACROCENTRUS AMICROPLOIDES, new species.

Type-locality.—Bethany Center, Genesee County, New York.

Type.—Cat. No. 15010, U.S.N.M.

Female.—Length 4 mm.; apparently related to *M. marginator* (Nees), from which it differs chiefly in the *Amicroplus*-like distal trochanters, the armature of which is atypical or apparently wanting, in the brownish face, in the anterior edge of the clypeus being arched rather than subemarginate, in the stramineous scape and pedicel, in the stramineous prothorax, in the rest of the thorax being brownish, in the almost colorless membrane of the wings, in the almost entirely stramineous legs, in the rather irregularly reticulate propodeum and in the sculpture of the third dorsal segment occupying most of the basal three-fourths of the segment.

Labeled, "June 26, 1911." Reared in association with *Archips argyrospila* by R. W. Braucher under his No. 136.

Allotype.—Essentially as in the type except in the much paler thorax.

Labeled, "C. U. Exp. No. 882, Sub. 3, June 18, 1911."

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METEORUS ARCHIPSIDIS, new species.

Type-locality.—Bethany Center, Genesee County, New York.

Type.—Cat. No. 15011, U.S.N.M.

Female.—Length 4 mm.; stramineous; greatest diameter of lateral ocellus a little more than half as long as the shortest distance between the same and nearest eye margin; scape externally, pedicel and flagel mostly brownish or blackish; interocellar area blackish; prescutum anteriorly, parapsides or scapulæ and axillæ more or less brownish; wings almost colorless, tinged with brown, veins stramineous with a blackish tinge, stigma mostly blackish, pale only at base, basal third mostly stramineous; onychii mostly brownish, hind tibiæ and hind metatarsi with brownish tips, second and third tarsal joints of hind legs mostly brownish, rest of legs like the face and palpi very pale stramineous; metanotum blackish; propodeum blackish, without a basal transverse carina, with a complete petiolarea and a well defined median longitudinal carina; first dorsal segment blackish to brownish, with a fossa on each side near the postpetiole, the postpetiole with longitudinal striæ except down the middle, the striæ converging posteriorly, second segment and basal half of third segment yellowish, rest of abdomen reddish except for a blackish, median, longitudinal stain; ovipositor when completely exserted apparently a little longer than the abdomen.

Labeled, "Bred from *Archips argyrospila*, June 24 1911, Braucher No. 122."

NOSERUS POMIFOLIELLAE (Ashmead).

Bracon pomifoliellæ ASHMEAD, Proc. U. S. Nat. Mus., vol. 11, 1888, p. 620.

APANTELES (PROTAPANTELES) HARNEDI, new species.

Type-locality.—McNeill, Mississippi.

Type.—Cat. No. 15013, U.S.N.M.

Female.—Length 2.5 mm.; related to *A.* (*P.*) *parorgyiæ* Ashmead, with which it agrees in having the vertical axis of the thorax as long as the transverse axis or longer, in the head being as broad or broader than long, in the stramineous tegulæ, rather dull outer face of hind coxæ, the latter being mostly pale reddish or stramineous, the mostly impunctate scutel, the punctures of which are rather large, in the pleuræ not being separated from the mesosternum by a carinate fold, in the propodeum having a median longitudinal carina, in the first, dorsal, abdominal plate being wider at apex than the second, dorsal, abdominal plate is long down the middle or than the former is wide at base and mostly rugose or rugulose, in the second, dorsal, abdominal plate being trapezoidal and in the third, dorsal, abdominal segment being sculptured at base, but differs chiefly in the black scape and

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tarsi and in at least half of the third, dorsal, abdominal segment being rather coarsely sculptured.

In the type there are blackish tips to the hind femora and the dorsum of the abdomen beyond the first segment is mostly tinged with black, while in the paratopotype these parts are mostly reddish.

Cocoons solitary and yellowish. Received from Prof. R. W. Harned, Agricultural College, Mississippi.

Named for Prof. R. W. Harned.

APANTELES (PROTAPANTELES) OXYACANTHOIDIS, new species.

Type-locality.—Maine.

Type.—Cat. No. 15014, U.S.N.M.

Female.—Length 2.5 mm.; facial line shorter than the transfacial line; antennæ blackish throughout, all joints of the flagel distinctly more than twice as long as thick; pleuræ not separated from the mesosternum by a carinate fold; scutel mostly impunctate, the interstices smooth and polished, the punctures small and indistinct, tegulæ blackish; thorax not depressed, vertical axis apparently greater than the transverse axis; wings with a brownish tinge, stigma and costa blackish, other veins stramineous with a dark tinge; coxæ blackish at base, more or less stramineous to brownish beneath, rest of legs mostly stramineous, onychii blackish; propodeum coarsely sculptured, the longitudinal carina almost lost among the rugæ; abdomen longer than the thorax; first dorsal plate wider at apex than at base and wider at apex than the second plate is long down the middle; second dorsal plate sculptured throughout, not distinctly depressed along the apical margin; third dorsal segment indistinctly sculptured to beyond the middle.

Labeled, "Me. Exp. Sta. Lot. 1478, June 4, 1912."

Paratypes are from New Haven, where the writer collected them May 14, 1904, on flowers of *Ribes oxyacanthoides.*

This species is related to *A.* (*Protapanteles*) *delicatus* Howard, from which it differs in the length of the abdomen, more shining face and dark mouth.

ROGAS LAPHYGMÆ, new species.

Type-locality.—Brownsville, Texas.

Type.—Cat. No. 15012, U.S.N.M.

Female.—Length, 4 mm.; has characters in common with *R. nolophanæ* Ashmead, but can be distinguished from that species by the hardly emarginate eyes, by the greatest diameter of the lateral ocelli being apparently shorter than the ocellocular line, by the 35-jointed antennæ, which are mostly brown or brownish, by the second abscissa

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Labeled, "Webster No. 6446, Exp. D., reared from *Laphygma frugiperda*, R. A. Vickery, collector."

APANTELES (STENOPLEURA) CHILOCIDA, new species.

Type-locality.—Japan.

Type.—Cat. No. 15015, U.S.N.M.

Female.—Length, 2 mm.; antennæ dark brown to blackish, mouth mostly pale; tegulæ, wing base, and stigma pale stramineous, wings with a brownish tinge, veins stramineous, legs, excepting hind coxæ, which are blackish, mostly stramineous to reddish stramineous; scutel polished, almost impunctate; propodeum rugulose, without a median, longitudinal carina; first and second dorsal abdominal plates rugulose, the former wider at apex than at base and approximately as wide at apex as the second plate is long down the middle, the second dorsal abdominal plate a little longer than the third dorsal abdominal segment which latter is perfectly smooth, polished and brownish, the remaining dorsal segments polished and blackish, the ventral, abdominal segments mostly pale; ovipositor hardly exserted.

Labeled, "*Chilo simplex*, No. 7, Kuwana, Coll., 1910."

APANTELES (STENOPLEURA) DEPRESSUS, new species.

Type-locality.—Lafayette, Indiana.

Type.—Cat. No. 15016, U.S.N.M.

Female.—Length, 1.5 mm.; antennæ mostly blackish, scape pale beneath; scutel virtually sculptureless; wings transparent with a brownish tinge; tegulæ stramineous; legs mostly reddish stramineous, tarsi more or less brownish, fore and mid coxæ black at base, hind coxæ almost entirely black; pleuræ not separated from the mesosternum by a carinate fold, not at all differentiated; propodeum rugulose, with a distinct median longitudinal carina; first dorsal plate, if anything, a little wider at apex than at base, apical margin nearly straight and distinctly wider than the second plate is long down the middle; first plate nearly one and one-half times as long as wide at apex and uniformly rugulose; second plate trapezoidal, uniformly rugulose, wider at apex than at base and nearly three times as wide at apex as long down the middle; third dorsal segment sculptured on the basal third; hypopygium hardly surpassing the pygidium; ovipositor barely exserted.

Labeled, "Reared from Tortricid larva, July 28, 1911; J. J. Davis, collector; Webster No. 7627."

Allotopotype.—Essentially as in the type, but the sides of the first plate rather arcuate.

Data same as for the type.

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APANTELES (STENOPLEURA) PODUNKORUM, new species.

Type-locality.—Berlin, Connecticut.

Type.—Cat. No. 15017, U.S.N.M.

Female.—Length, 1.75 mm.; black; head apparently as wide as long, antennæ dark brown, labrum and mandibles mostly brownish, palpi pale; tegulæ brownish; scutel almost impunctate; wings transparent, tinged with brown, costa, stigma, radius, transverse cubitus, and second and third abscissæ of the cubitus brownish, remaining veins mostly colorless or at most a paler brownish stramineous than the stigma; coxæ black, trochanters more or less dark, rest of legs mostly stramineous with the hind femora and tibiæ rather reddish with fuscous tips; mesopleuræ not separated from mesosternum by a carinate fold; propodeum rugulose, distinctly carinate down the middle; first dorsal plate distinctly wider at apex than at base or than the second is long down the middle, the latter plate not sculptured all over, mostly shining with indefinite sculpture, third dorsal segment not sculptured at base or elsewhere except for a few scattered punctures; ovipositor hardly exserted.

Labeled, "Emerged Feb. 14, 1911, No. 330." Probably parasitic on *Pyrausta futilalis*.

Family ICHNEUMONIDÆ.

ANGITIA PLUTELLÆ, new species.

Type-locality.—Rocky Ford, Colorado.

Type.—Cat. No. 15018, U.S.N.M.

Female.—Length, 4 mm.; related to *A. hellulæ* Viereck, from which it may be known by the entirely black dorsal segments of the abdomen, by the second abscissa of the discoidal vein being distinctly longer than the third, by the hind metatarsus being mostly whitish on its basal half and by the parallel sided postpetiole, which is more oblong or apparently one and one-half times as long as broad.

Labeled, "Bred from *Plutella omissa*, Apr. 23, 1912, H. O. Marsh, collector."

Allotype.—Essentially as in the type. Data same as in the type.

This may be the same as (*Limneria*) *Angitia ? plena* (Provancher).

ANISITSIA NIGERRIMA, new species.

Type-locality.—Priest Lake, Idaho.

Type.—Cat. No. 15019, U.S.N.M.

Female.—Length, 14 mm.; almost entirely black; fore tibiæ and tarsi rather dark brown; wings tinged with brown, the veins blackish; nervellus distinctly bent below the middle, antefurcal; first part of membranous portion on the underside of the second dorsal segment with its apex remote from the spiracles or not as near the spiracles

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of the second dorsal segment as the latter are to the lateral edge of the segment.

Labeled, "Aug., 1901; C. V. Piper, collector."

BARYDOTIRA HAMMARI, new species.

Type-locality.—North East, Pennsylvania.

Type.—Cat. No. 15020, U.S.N.M.

Female.—Length, 3.5 mm.; judging from Schmiedeknecht's classification of European Hemitelini, this is related to *Hemiteles coriarius* Taschenberg, from which it may be known by the polished head and thorax, by the brownish stramineous legs, including the coxæ, by the stramineous tegulæ, by the absence of the longitudinal carinæ beyond the apical transverse carina; by the first segment except its apical margin, the second except its apical fourth, and the third except its apical half being granularly sculptured, the rest of the abdomen being polished and by the shorter ovipostor, the exserted portion of which is hardly longer than the first segment.

In this species the wings are brownish and the areola and basalarea confluent.

Labeled, "Quaintance No. 3335, June 25, 1909; A. G. Hammar, collector."

In two female paratopotypes the areola is more or less regularly separated from the basal area by a carina; in one female paratopotype the petiolarea is divided longitudinally down the middle by a carina—evidently a monstrosity. Paratopotype with the same data except that two are labeled, "No. 3734, Host 3323, Aug. 9, 1909."

Named for Mr. A. G. Hammar.

BATHYTHRIX KUWANÆ, new species.

Type-locality.—Nishigahara, Tokio, Japan.

Type.—Cat. No. 15021, U.S.N.M.

Female.—Length 4 mm.; apparently nearest to *Hemiteles stagnalis* Thomson, as redescribed by Schmiedeknecht but differs as follows: Vertex and mesonotum polished; antennæ hardly 4 mm. long; first segment almost polished; scape, pedicel, first joint of flagel, most of legs, including coxæ and most of abdomen stramineous; postpetiole as long as the petiole and hardly wider, the apical half of the middle longitudinal third pale; elsewhere the first segment is black; second segment blackish laterally on the basal two-thirds, the rest of the segment with a stramineous, funnel-shaped mark; third segment with a blackish mark on each side, leaving an hour-glass shaped stramineous mark; fourth segment blackish at base; rest of abdomen mostly stramineous.

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If this species is held to have a median longitudinal keel on the pronotum, there being a suggestion of such a keel, then it might be said to be related to *Hemiteles alpivagus* Strobl in Schmiedeknecht's arrangement.

CALLICRYPTUS MAGNIFICUS, new species.

Type-locality.—Guatemala City, Guatemala.

Type.—Cat. No. 15022, U.S.N.M.

Female.—Length 14 mm.; apparently related to *Cryptus? xanthostigma* Brullé, as figured in Cameron's Biologia Centrali Americana article, from which it can be distinguished as follows: Rich maroon, fifth joint more or less yellow like the eleventh and twelfth, the joints between these completely yellow; fore legs concolorous with the body, except coxæ, trochanters, femora above and on basal half beneath and tarsi which are more or less black; mid and hind legs virtually completely black or blackish; post-petiole finely reticulated or granular in appearance, third dorsal segment black at base.

Collected by Mrs. W. P. Cockerell.

CALLIPHRURUS? TÆNIOGASTER, new species.

Type-locality.—North East, Pennsylvania.

Type.—Cat. No. 15023, U.S.N.M.

Male.—Length 4.5 mm.; head finely punctured, shining; face, a border along inner eye margin to top of eyes, cheeks, malar space, clypeus, mandibles, except tips, scape and pedicel beneath, most of prothorax, fore and mid coxæ and proximal trochanters and apical edge of third and following dorsal abdominal segments yellow; head wider than long, greatest diameter of lateral ocelli apparently a little shorter than shortest distance between the same and nearest eye margin; first joint of flagel nearly one and one-half times as long as the second; head beneath, mouth and palpi yellowish, vertex and occiput mostly blackish; mesopleuræ, mesosternum and metapleuræ mostly pale brown, rest of thorax mostly black or blackish; propodeum mostly blackish, with a transverse furrow at base, basalarea open at base, rather quadrate, costulæ incomplete, areola longer than wide, apical transverse carina complete, propodeum with three areæ beyond the apical transverse carina; fore and mid distal trochanters, femora, tibiæ and tarsi, hind coxæ, trochanters and femora mostly stramineous, hind tibiæ and tarsi mostly infuscated; abdomen mostly black above, yellowish beneath, first segment at least twice as wide at apex as at base, with a fossa on each side near the base, the middle third with two posteriorly diverging carinæ, spiracles in the middle, postpetiole rugulose; second segment finely sculptured, apparently half again as long as wide at base, spiracles as near to each other as to the apex, thyridia at base; third segment less sculptured than the second; the succeeding segments almost sculptureless.

Labeled, "Quaintance No. 3355, May '08."

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CAMPOPLEX EPINOTIÆ, new species.

Type-locality.—Carmel, California.

Type.—Cat. No. 15024, U.S.N.M.

Female.—Length 7 mm.; related to (*Limnerium*) *Campoplex nigricincta* Ashmead, from which it can be distinguished by the blackish hind femora, by the scape being blackish beneath and by the larger size. The characters held in common by these two species are the quadrate head with the outside line of eyes and temples nearly in the same plane and the length of the greatest diameter of the lateral ocelli which is as great as or greater than the distance between the latter and the nearest eye margin.

Labeled, "Kearfott No. 606, from *Epinota arctostaphylina*, July 6."

CAMPOPLEX POLYCHROSIDIS, new species.

Type-locality.—Hyattsville, Maryland.

Type.—Cat. No. 15025, U.S.N.M.

Female.—Length 5.5 mm.; greatest diameter of lateral ocelli distinctly shorter than the shortest distance between the latter and nearest eye margin; scape and pedicel brownish stramineous beneath; fore and mid legs including coxæ mostly brownish stramineous, hind legs with their coxæ black, their femora rather reddish, elsewhere mostly brownish stramineous; propodeum not channeled; abdomen mostly reddish, first segment except at apex, basal half of second dorsal segment and the remaining dorsal segments medially, more or less black or blackish; exserted portion of ovipositor approximately as long as the thorax.

Labeled, "Kearfott No. 694, from *Polychrosis carduiana*, Aug. 6."

Paratopotypes with the same data as the type.

Paratype labeled, "Kearfott No. 262, from *Platyptilia carduidactyla*, Richmond Hill, New York, July 12."

CASINARIA EUPITHECIÆ, new species.

Type-locality.—East River, Connecticut.

Type.—Cat. No. 15026, U.S.N.M.

Female.—Length 5.5 mm.; greatest diameter of lateral ocellus distinctly greater than distance between latter and nearest eye margin; scape and pedicel more or less pale beneath, mandibles yellow with brown tips, palpi stramineous; tegulæ and wing base yellow; fore and mid coxæ black with brownish tips, fore and mid trochanters mostly stramineous, fore femora and tibiæ and mid femora rather reddish stramineous, fore tarsi stramineous with the onychium brownish, mid tibiæ and tarsi pale, tinged with brown, hind coxæ

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brown, elsewhere dark brown, spurs whitish, hind metatarsus whitish at base, elsewhere brown as are the other hind tarsi; dorsal abdominal segments almost entirely black, thyridia pale, venter mostly dark brown; ovipositor when exserted a little longer than the second segment.

Labeled, "Reared from *Eupithecia miserulata*, Aug. 27, 1910; Chas. R. Ely."

Allotopotype.—Essentially as in the type.

Labeled the same as the type excepting the date, which is Sept. 10, 1910.

A paratopotype is dated Sept. 8, 1910.

A paratype is labeled, "Stafford, Conn., Aug. 24, 1905; Solidago, W. E. Britton."

The cocoon is brownish at both ends with a rather whitish girdle and measures 5 by 2 mm.

CREMASTIDEA, new subgenus.

Type.—*Cremastus* (*Cremastidea*) *chinensis*, new species.

Compared with *Cremastus* Gravenhorst as represented by *Cremastus bellicosus* Gravenhorst, this genus differs chiefly in the malar space being virtually crowded out by the eye and by the porpodeum overlapping the hind coxæ to the middle or a little beyond the middle of the latter.

CREMASTUS (CREMASTIDEA) CHINENSIS, new species.

Type-locality.—Soochow, China.

Type.—Cat. No. 15027, U.S.N.M.

Male.—Length 9 mm.; yellowish stramineous; mandibles with blackish tips, interocellar area blackish; ocelli almost equidistant from each other, the lateral ocelli nearer to the anterior ocellus than to each other and almost impinging on the eye margin; flagel brownish, first joint distinctly longer than the second; tibiæ more or less darkened with brownish stains; basal area almost forming an equilateral triangle, areola pentagonal, almost half as long as the propodeum and apparently a little longer than the petiolarea; petiole with a shallow fossa on each side near the postpetiole; second dorsal segment finely, longitudinally sculptured, the other dorsal segments more or less finely, indefinitely sculptured; the sutures between the first and second segments blackish.

Labeled, "from N. Gist Gee."

Allotype.—Length 8 mm.; ocellocular line nearly half as long as the shortest diameter of the lateral ocellus; malar space nearly as long as the first joint of the flagel is thick at base; otherwise essentially as in the type.

Labeled, "from *Naraga diffusa?*; Konosu Saitama, Japan; T. Fukai collector."

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CRYPTUROPSIS MICROGASTER, new species.

Type-locality.—Quirigua, Guatemala.

Type.—Cat. No. 15028, U.S.N.M.

Male.—Length 10 mm.; apparently related to *Mesostenus? megapoda* Cameron, as figured and described in Cameron's Biologia Centrali Americana article, from which it may be distinguished as follows: Antennæ not stout, not as long as the body, face not at all transversely striated, center of vertex not aciculated, front black with a yellow orbital margin continuous with the yellow ornamentation of the face, the latter not broken by black marks or lines; malar space and lower half of cheeks yellow, occipital carina prominently elevated near the malar space; mesonotum punctured, becoming rugulose in the middle of the posterior half; metapleuræ yellow, broadly margined with black; propodeum mostly, rather reticulated, black with the tubercles and area intimately surrounding the tubercles yellow; fore and mid coxæ blackish at base, fore and mid femora rather reddish stramineous above, onychii, and third and fourth tarsal joints of all legs blackish, mid legs with the apex of the first tarsal joint and the second tarsal joint also blackish, hind legs mostly black except the coxæ above, distal joint of trochanters and basal third of hind tibiæ which are yellowish; first dorsal segment yellow with a subapical transverse black band, the following dorsal segments black with an apical yellow margin, abdomen ventrally mostly yellow.

Collected by Mrs. W. P. Cockerell.

CYMODUSOPSIS, new genus.

Type of the genus.—*Cymodusopsis aristoteliæ*, new species.

Related to *Idechthis* (Foerster) Ashmead, from which it differs, especially in the hairy eyes that converge below in the female as in *Cymodusa* Holmgren and by the absence of an areolet.

CYMODUSOPSIS ARISTOTELIÆ, new species.

Type-locality.—Kirkwood, Missouri.

Type.—Cat. No. 15029, U.S.N.M.

Female.—Length 4.5 mm.; scape and pedicel yellowish beneath, rest of antennæ brownish to blackish; mandibles yellowish with brownish tips; palpi whitish; tegulæ, base of wings, coxæ and trochanters of fore and mid legs, fore and mid tibiæ above, most of fore and mid tarsi, distal trochanters of hind legs and plica, yellowish; hind coxæ blackish; hind tibiæ with the middle third yellowish; hind, proximal trochanters blackish, femora reddish stramineous, hind metatarsi whitish at base, rest of legs mostly brownish; areola and petiolarea confluent, costulæ poorly developed; second dorsal

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segment reddish apically, the following segments with the sides mostly reddish, otherwise the abdomen is black above; exserted portion of ovipositor nearly as long as the first segment.

Labeled, "Parasite on No. 231 M. *Aristotelia pudibundella* Zell. Oct. 15, 1881."

Allotopotype.—Essentially as in the type, except that the eyes hardly converge beneath. Labeled the same as the type.

ECTOPIMORPHA, new genus.

Type of the genus.—*Amblyteles anceps* (Cresson).

Related to *Hypomecus* Wesmael in having the eighth dorsal abdominal segment exserted, but in the propodeal spiracles quite as in typical Amblypygi, in which group it indubitably belongs.

PIMPLA (EPIURUS) KUWANÆ, new species.

Type-locality.—Japan.

Type.—Cat. No. 15030, U.S.N.M.

Female.—Length 7.5 mm.; related to *P.* (*E.*) *brevicornis* Gravenhorst, from which it may be known by the flagel being yellowish to pale brown beneath, by the notauli not being distinctly impressed anteriorly, by the entirely stramineous stigma, by the nervellus being branched near the middle, by the hind tarsi excepting the basal half of metatarsus being uniformly brownish, by the poorly defined or wanting lateral carinæ of the first, dorsal, abdominal segment, and by the exserted portion of the ovipositor being distinctly shorter than the abdomen, but nearly two-thirds the length of the latter.

Labeled, "No. 4, host—*Parnara guttatus* Kuwana Coll."

HERPESTOMUS HYPONOMEUTÆ, new species.

Type-locality.—Japan.

Type.—Cat. No. 15031, U.S.N.M.

Female.—Length 6.5 mm.; related to *H. brunneicornis* (Gravenhorst), from which it differs chiefly in the blackish antennæ, black clypeus, blackish mandibles, mostly dark to blackish hind tibiæ and tarsi, and in the abdomen being black except for the rather stramineous apical margin to the second segment.

Labeled, "Ex. *Hyponomeuta malinellus* on apple; S. T. Kuwana, P. J. Parrott, dedit."

Allotype.—Essentially as in the type except that the face, clypeus

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HYPOSOTER DIVERSICOLOR, new species.

Type-locality.—East River, Connecticut.

Type.—Cat. No. 15032, U.S.N.M.

Female.—Length 5.5 mm.; related to *H. parorgyiæ* Viereck, from which it differs especially in the following particulars: Lateral ocelli nearer the eye than to the anterior ocellus; clypeus mostly yellowish; scape uniformly dark stramineous beneath, pedicel paler beneath than the scape; fore and mid coxæ yellowish, hind legs with coxæ, trochanters and femora more or less reddish, their tibiæ reddish brown, pale at base, with a subbasal and apical dark-brown band, their tarsi dark brown; basal area rather petiolate triangular; abdomen reddish with the first segment, basal two-thirds of second segment, excepting thyridia, third basally, fourth to sixth dorsally, black or blackish; abdomen truncate at apex, its ovipositor hardly as long as the truncature, abdomen, apically, compressed.

Labeled, "No. 145, from larva on hickory, July 7, 1910; Chas. R. Ely."

Cocoon covered with loose rather whitish gray silk and apparently 5 by 2 mm.

HYPOTHEREUTES ELYI, new species.

Type-locality.—East River, Connecticut.

Type.—Cat. No. 15033, U.S.N.M.

Female.—Length 5 mm.; related to *H. caradrinæ* Viereck, from which it may be known by the malar line being shorter than the mandibles are wide at base, by the scape being yellow beneath, by the fore and mid coxæ and all trochanters being almost entirely pale yellowish, by the mostly brownish stramineous fore and mid tibiæ and femora, by the reddish hind coxæ and femora, by the nervellus being angulated, by the areola being a little longer than wide, and by the dorsal abdominal segments being black except for the brownish thyridia, rather stramineous apical margin to the second segment and the rather reddish spot on each side of the third segment. Plica yellowish.

Labeled, "July 30, 1910; Chas. R. Ely."

Named for Dr. Charles R. Ely.

HYPOTHEREUTES NIGROLINEATUS, new species.

Type-locality.—Springer, New Mexico.

Type.—Cat. No. 15034, U.S.N.M.

Female.—Length 5 mm.; related to *H. caradrinæ* Viereck, from which it can be distinguished by the rather parallel-sided attenuate areola, which is at least twice as long as wide, by the more slender

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segments having a black stripe down the middle.

Labeled, "9. 3. '09, 9. 1. '09; C. N. Ainslie, collector; Webster No. 5535; host *Heliophila albilinea*."

Allotopotype.—Essentially as in the type; the sixth and seventh segments apparently entirely black.

Labeled the same as the type.

Two males from the same lot as the above specimens agree with the allotopotype except in the presence of a more or less distinct fossa on each side of the petiole, indicating that they belong to *Angitia* Holmgren. The existence of these males throws a doubt on the validity of *Hypothereutes* (Foerster) Ashmead as a genus or subgenus.

ICHNEUMON KLAGESI, new name.

Proposed for *I. flavofascialis* Viereck,[1] which is preoccupied by *I.* (*Probolus*) *flavofascialis* Viereck.[2]

Named for Mr. H. G. Klages, who collected the species.

PIMPLA (ISEROPUS) VIDUIFORMIS, new species.

Type-locality.—New Haven, Connecticut.

Type.—Cat. No. 15035, U.S.N.M.

Male.—Length 8.5 mm.; this may prove to be the male of *Pimpla vidua* Walsh, the female of which alone is known. From Walsh's description of the above species this differs in the antennæ, being yellow to brownish beneath, blackish above, in the punctured propodeum, which has its angles tipped with yellow, in the absence of a reddish spot above the mid coxæ, in the venter being yellowish and blackish, in the mid coxæ and trochanters being almost entirely yellowish, in the mid tibiæ being without a trace of an annulus, in the hind legs having the coxæ and femora reddish throughout and their trochanters yellow, in the hind tibiæ having the apical third blackish, and in the parts mentioned as white in Walsh's description being yellow.

Labeled, "No. 322, Apr. 20, 1910; A. B. Champlain."

The smallest paratopotype is scarcely 7 mm. long and has a subapical reddish transverse, medially more or less interrupted reddish stripe on the second to sixth dorsal abdominal segments, inclusive.

MALLOCHIA, new genus.

Type of the genus.—Mallochia agenioides, new species.

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oped sternauli, which are represented merely by a slight depression of the tegument and a difference in sculpture, in the occipital carina not being humped just before reaching the oral carina, and in the postpetiole, which is nearly twice as long down the middle as wide at base.

Named in honor of my colleague, Mr. J. R. Malloch.

MALLOCHIA AGENIOIDES, new species.

Type-locality.—Glencarlyn, Virginia.

Type.—Cat. No. 15036, U.S.N.M.

Female.—Length 7.5 mm.; head, including the scape, mostly reddish and shining; lateral ocelli a little nearer to each other than to the nearest eye margin and distinctly nearer to the anterior ocellus than to each other; pedicel and basal half of first joint of flagel rather reddish, tinged with brown, rest of flagel mostly blackish excepting the fifth, sixth, seventh, eighth, and ninth joints, which are mostly or at least partly yellow above; basal half of mandibles rather stramineous, the apical half blackish; thorax reddish, shining, and mostly punctured, excepting the scutel, which is rather stramineous, almost impunctate, and polished; cubitus hardly apparent beyond the recurrent vein, stigma mostly stramineous, veins blackish, wings with a smoky band before the tip, running nearly parallel with the recurrent vein, and a smoky spot occupying part of the discocubital, second and third discoidal cells; legs, including coxæ and trochanters, mostly reddish, the onychiæ brownish to blackish; propodeum reddish and distinctly, rather transversely, sculptured; abdomen rather subtle, through the presence of sculpture and reddish; petiole perfectly smooth and polished except for a few scattered punctures and delicate sculpture; postpetiole in sculpture similar to the petiole; sheaths of the ovipositor blackish and apparently 3 mm. long.

Collected June 9, 1912, by Mr. J. R. Malloch.

NEONORTONIA, new subgenus.

Type.—*Casinaria* (*Neonortonia*) *genuina* (Norton).

Related to *Casinaria* Holmgren as represented by *C. claviventris* Holmgren, with which it agrees in the produced portion of the propodeum extending practically to the middle of the hind coxæ and in the virtually exareolate propodeum, but can be distinguished by the different *Trophocampa*-like habitus and in the neither angulate nor branched nervellus.

NEOPRISTOMERUS, new genus.

Type of the genus.—*Pristomerus appalachianus* Viereck.

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parallel and far removed from the lateral ocelli.

To this genus very likely belong *Pristomerus coloradensis* Brues and *P. pacificus* Cresson.

(PRISTOMERUS) NEOPRISTOMERUS APPALACHIANUS var. DORSOCASTANEUS Vierock.

Brownsville, Texas.

Labeled, "Webster No. 6446, reared from *Laphygma frugiperda;* R. A. Vickery, collector."

PIMPLA (PIMPLA) PARNARÆ, new species.

Type-locality.—Japan.

Type.—Cat. No. 15037, U.S.N.M.

Female.—Length 16 mm.; related to *P. pluto* Ashmead, from which it differs especially in the metapleuræ not being striate throughout, in the first, dorsal, abdominal segment not being carinate laterally, but rounded off, and in the dorsal aspect being rounded off where it joins the anterior aspect and not developed into a node on each side.

Labeled, "Host *Parnara guttatus* Burm. No. 3; S. I. Kuwana."

POLYCYRTUS COCKERELLÆ, new species.

Type-locality.—Quirigua, Guatemala.

Type.—Cat. No. 15038, U.S.N.M.

Female.—Length 12.5 mm.; appears to be related to *Polycyrtus fulvipes* Cameron, as described and figured in Cameron's Biologia Centrali Americana article, from which it may be known by the following differences: Antennæ apparently as long as the body; the joints of the flagel beyond the annulus more or less faceted, the facets rather bare, elsewhere the antennæ are quite generally hairy; front mostly black, mandibles mostly yellowish or luteous; head almost sculptureless; thorax and propodeum almost sculptureless; pronotum blackish, with pale margins, with a stramineous lamina on the anterior inferior edge and a longitudinal carina between the dorsal and lateral aspects of the pronotum; mesonotum black except for the ridges between it and the scutel, which are yellowish; scutel black, most of sides and posterior edge yellowish; true metanotum blackish on each side; propodeum mostly black between base and basal transverse carina; rest of thorax and propodeum stramineous;

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A NEWLY FOUND METEORIC IRON FROM PERRYVILLE, PERRY COUNTY, MISSOURI.[1]

By GEORGE P. MERRILL,
Head Curator of Geology, United States National Museum.

The iron described below was found by Mr. John Monaghan in August, 1906, on the farm of a Mr. Patrick Monaghan, about 1 mile west of the town of Perryville. It lay in an open field and was about three-fourths buried in the soil. Nothing is known regarding its fall. As secured by the United States National Museum the mass weighed 17.386 kilograms, including a 75-gram fragment that had been cut from it for testing. Allowing for waste in cutting, 17.5 kilograms would probably represent its original weight as nearly as obtainable. How much had been lost by oxidation from the exterior surface it is, of course, impossible to state.

The general appearance of the mass is well shown in figures 1 and 2, plate 44. The surface was almost completely coated with oxidation products, and scales of oxide could be readily removed by means of any hard, sharp instrument. Nevertheless, indications of surface fusion in its flight, in the shape of obscure, shallow pittings, were still evident, and are shown in the plate. In figure 2 two considerable pits, formed through the oxidation of troilite nodules, are in evidence. An etched surface of the iron brings out some rather unusual features. In structure the iron is an octahedrite, but the crystallization is so fine as to be almost microscopic. (See pl. 45.) The metallic plates aligned parallel with the octahedral face are rarely, if ever, a millimeter in thickness, and are lacking in uniformity throughout their lengths. They are also wavy, forming an irregular network of lines with a general octahedral trend as shown in figure 2 of plate 45. Parallel with these plates lie the extremely thin, almost microscopic plates of schreibersite recognizable by the naked eye only by their bright

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any other available for comparison in the national collections. According to the figures given by Brezina and Cohen,[1] however, it would seem to more closely resemble the Cowra iron. The plessite areas are very poorly developed, and in places wholly indistinguishable or quite lacking. Troilite occurs in the usual rounded nodules, the remainders of two larger forms showing at the top and bottom of figure 1, plate 45, and a smaller one at the immediate left of figure 2. The metal, it is well to note, is very tough and hard and can not be cut at all by the ordinary hacksaw used by metallurgists.

In connection with investigations on the minor constituents of meteorites carried on under a grant from the National Academy of Sciences it was possible to make a very thorough analysis of the iron, the analytical work being done under the supervision of Dr. J. E. Whitfield. These results are given in column 1 below. In column 2 is given the average of two analyses of the Ballinoo iron by Sjöström [2] and Mariner and Hoskins.[3]

	(1)	(2)
	Per cent.	Per cent.
Iron (Fe)	89.015	89.625
Nickel (Ni)	9.660	9.86
Cobalt (Co)	.545	.67
Copper	.025	.03
Manganese	None.	....
Phosphorus	.365	.49
Sulphur	.002	.03
Silicon	.003	Trace.
Carbon	.015	.02
Ferric oxide	.370	....
Iridium	Trace.	....
Palladium	Trace.	....
Platinum	Trace.	....
Ruthenium	Trace.	....
	100.00	100.725

Specific gravity 7.61. Determined in picnometer flask at 22.4° C. and on chips showing no visible troilite.

The amounts of the rarer elements found in different samples of the iron were quite variable though always small. In one portion of 25 grams was found 0.004 gram of platinum, and in another of 100 grams but 0.002 gram. The precipitates of ammonium platinum chloride were in all cases colored faintly orange, indicating the presence of palladium, but in amounts too small for determination. In another 100-gram portion of the iron was found 0.014 gram of ruthe-

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1

2

THE PERRYVILLE, MISSOURI, METEORIC IRON.

Fig. 1.—The specimen as received at the U. S. National Museum. About one-half natural size. Fig. 2.—The same in reversed position.

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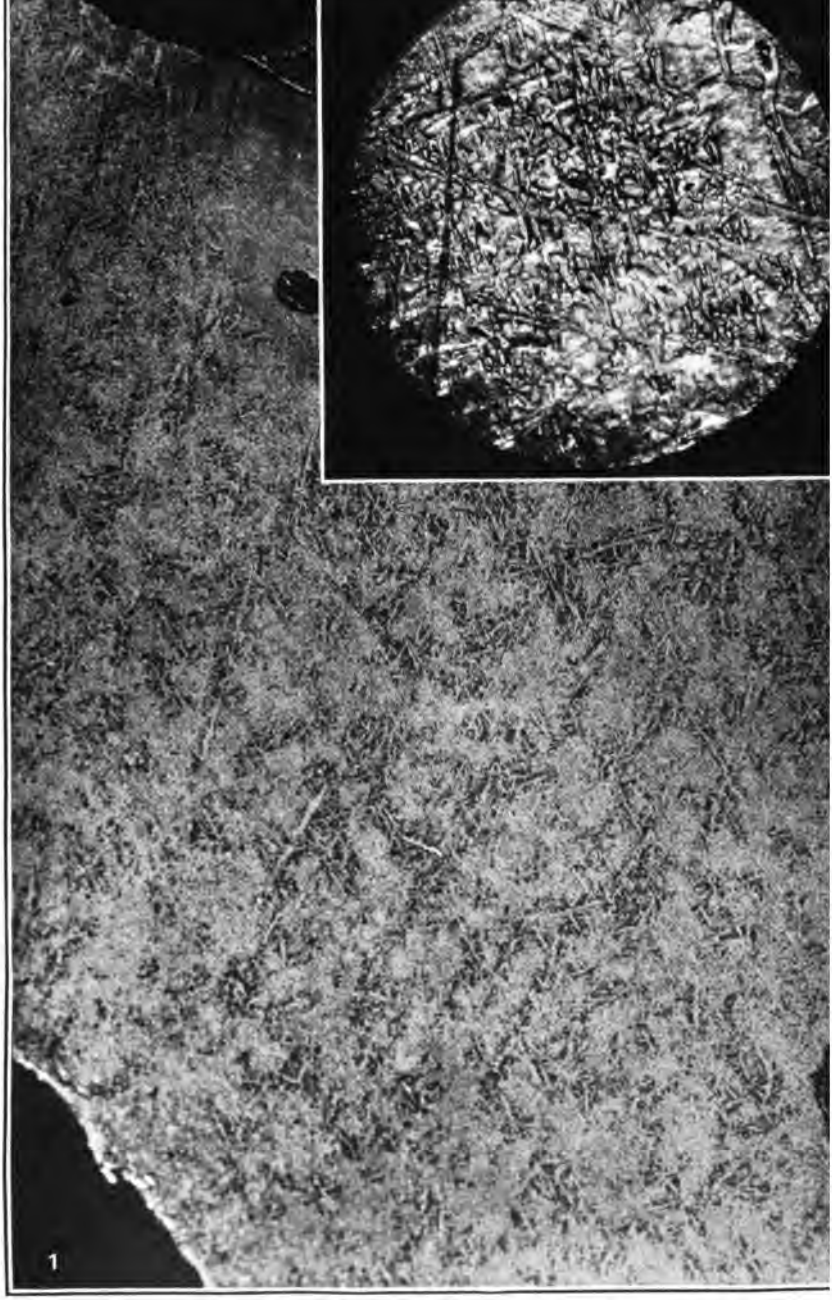

THE PERRYVILLE, MISSOURI, METEORIC IRON.

1. Etched surface enlarged about 2 diameters. 2. Magnified surface photographed under th microscope and by reflected light.

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iridium. So far as the writer recalls this is the first authentic instance of the occurrence of ruthenium in a meteoric iron. Palladium was reported by Trottorelli[1] in the Collescipoli meteoric stone, but the amount (0.7745 per cent) is so great that taken in connection with other features of his analysis one is inclined to question the correctness of the determination. Davison[2] detected iridium in connection with platinum in the Coahuila iron.

The schreibersite separated out in process of analysis yielded:

	Per cent.
Phosphorus	14.00
Iron	51.10
Nickel	34.13
Cobalt	.30
	99.53

The nickel content of the schreibersite, it will be observed, is unusually high though not unprecedentedly so. Cohen[3] records 34.05 per cent in that of the iron of Magura; 33.15 per cent in that of Santa Rosa, Mexico; 32.99 per cent in that of Lime Creek, Alabama; 31.71 per cent in that of Bolson de Mapimi, Mexico; 36.17 per cent in that of Seelasgen, Germany; and 38.24 per cent NiCo in that of Cranbourne, Australia. The deducible formula conforms readily to Cohen's $(FeNiCo)_3P$, the iron, nickel, and cobalt being considered as variables. The nickel-cobalt content of the iron—10.205 per cent—it will be observed, is a trifle higher than the average in Cohen's Salt River group (9.55 per cent), as given by Farrington.[4]

This iron is very inactive, showing no signs whatever of polarity and taking the copper but slowly and unevenly, often only after an exposure of several minutes and perhaps complete evaporation of the sulphate solution.

[1] Ber. deut. chem. Ges., Berlin, vol. 24, 1891, p. 352.
[2] Amer. Journ. Sci., vol. 7, 1899.
[3] Meteoritenkunde, vol. 1, p. 132.
[4] Analyses of Iron Meteorites Compiled and Classified. Publ. 120, Field Columbian Museum, 1907.

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[SCIENTIFIC RESULTS OF THE PHILIPPINE CRUISE OF THE FISHERIES STEAMER "ALBATROSS," 1907–1910.—No. 23.]

FOUR NEW GENERA AND FIFTY-EIGHT NEW SPECIES OF STARFISHES FROM THE PHILIPPINE ISLANDS, CELEBES, AND THE MOLUCCAS.

By WALTER K. FISHER,

Of Stanford University, California.

The new genera and species of starfishes described in this paper were obtained from among the Philippine Islands and the neighboring islands to the southward by the U. S. Fisheries steamer *Albatross* during her cruise of 1907–1910. These species will be fully illustrated and described in greater detail in the final report on the collection, now in course of preparation.

In a previous paper[1] the following genera, each based on a new species, were described:

Benthogenia (Porcellanasteridæ).
Anthosticte (Astropectinidæ).
Pontioceramus (Goniasteridæ).
Lithosoma (Goniasteridæ).
Atelorias (Goniasteridæ).
Hymenasterides (Pterasteridæ).

In the present paper the following new genera are characterized:

Ctenopleura (Astropectinidæ, near *Astropecten*).
Astromesites (Astropectinidæ, near *Blakiaster*).
Perissogonaster (Goniasteridæ, near *Paragonaster*).
Astrothauma (Goniasteridæ, near *Calliaster*).

A new subgenus of *Dytaster*, *Koremaster*, founded on a new species, *Dytaster evaulus*, is described.

A list of the new species and subspecies is given for quick reference.

PORCELLANASTERIDÆ.

Sidonaster psilonotus.
Ctenodiscus orientalis.

GONIOPECTINIDÆ.

Goniopecten asiaticus.
Prionaster analogus.
Prionaster gracilis.
Prionaster megaloplax.

[1] New genera of starfishes from the Philippine Islands, Proc. U. S. Nat. Mus., vol. 40, May 17, 1911, pp. 415–427.

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ASTROPECTINIDÆ.

Astropecten acanthifer phragmorus.
Astropecten eremicus.
Astropecten luzonicus.
Astropecten tenellus.
Astropecten pedicellaris.
Ctenopleura astropectinides.
Ctenophoraster diploctenius.
Psilaster gotoi.
Psilaster robustus.
Astromesites compactus.
Persephonaster euryactis.
Persephonaster anchistus.
Persephonaster luzonicus.
Persephonaster tenuis.
Persephonaster multicinctus.
Persephonaster suluensis.
Persephonaster ædiplax.
Persephonaster habrogenys.
Persephonaster monostæchus.
Tritonaster evorus.
Dipsacaster diaphorus.
Patagiaster sphærioplax.
Dytaster (Koremaster) evaulus.

GONIASTERIDÆ.

Mimaster notabilis.
Pseudarchaster oligoporus.
Aphroditaster microceramus.
Paragonaster ctenipes hypacanthus.
Paragonaster stenostichus.
Perissogonaster insignis.
Rosaster nannus.
Rosaster mimicus.
Rosaster mamillatus.
Nymphaster euryplax.
Nymphaster dyscritus.
Nymphaster mucronatus.
Nymphaster leptodomus.
Nymphaster moluccanus.
Nymphaster arthrocnemis.
Nymphaster meseres.
Nymphaster habrotatus.
Nymphaster atopus.
Ceramaster smithi.
Peltaster cycloplax.
Sphæriodiscus scotocryptus.
Iconaster perierctus.
Astroceramus lionotus.
Astroceramus sphæriostictus.
Calliaster corynetes.
Astrothauma euphylacteum.
Anthenoides granulosus.
Anthenoides lithosorus.
Anthenoides rugulosus.

Family PORCELLANASTERIDÆ.

SIDONASTER PSILONOTUS, new species.

Differing from *S. vaneyi* and *S. batheri* in the almost entire absence of abactinal spinelets. R = 22 mm., r = 11 mm.; R = 2 r. Breadth of ray at distal edge of cribriform organ, 7 mm.; width of cribriform organ 6.5 mm.; height, interradially, 4 mm.

Abactinal integument devoid of spinelets except for about 24, scattered close to each cribriform organ, and not extending distally beyond the edge of this organ. Spinelets about as long as those on surface of cribriform organ. Papulæ numerous, prominent, and occupying a pentagonal area, the corners of which touch the middle of each cribriform organ. Abactinal plates, spaced, microscopic, perforated, roundish, or irregular in outline. Cribriform organs very prominent, wider than high, with slightly convex upper border, and leaving only a very narrow bare area on distal edge of the plates. Superomarginals with a single, slender, prominent [illegible]

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7 in number, and higher than inferomarginals. Terminal plate with 5 terminal, prominent, sharp spinules. Adambulacral plates with 2 marginal spinules, occupying about the adoral half of the concave furrow margin. Mouth plates with 4 tapering, sharp marginal spines spaced from the unpaired median tooth.

Type.—Cat. No. 30504, U.S.N.M.

Type-locality.—Unknown, but probably among the Philippine Islands.

CTENODISCUS ORIENTALIS, new species.

Differs from *Ctenodiscus crispatus* in having longer and relatively much more slender rays, on which the paxillar area is very narrow; constantly very small paxillæ; very much more numerous marginal plates; lower inferomarginals, of which the whole exposed surface is confined to lateral surface of ray; very delicate, and not at all flattened fasciole spinelets; smaller and more numerous actinal plates in each corresponding double series; differently shaped and more angular adambulacral plates, with a different armature; madreporic plate with finer and more numerous ridges. R = 52 mm., r = 14 mm., R = 3.7 r; breadth of ray at middle of R, about 10 mm. Marginal plates 26 or 27 in each series. In each double series of actinal intermediate plates nearest interradial line, 16 to 23 plates (8 to 12 in a single series). In *crispatus* 16 plates is the maximum number. Adambulacral plates with the aboral half of furrow margin excavated to receive the tube foot, the adoral half being prominent and angular, with 3 tapering, sharp spinules, the median the longest, proximally equaling width of plate, distally exceeding width. One or 2 smaller spinelets continue the furrow series along the concave portion of margin, and directly behind these on the surface of plate is a conical hyaline spinelet stouter and shorter than the furrow spinelets, except on the first 5 or 6 plates where it is more delicate than the furrow spinelets. Mouth plates with 4 or 5 marginal and 5 to 8 suboral spinelets.

Type.—Cat. No. 30505, U.S.N.M.

Type-locality.—Station 5528, between Siquijor and Bohol Islands, Philippine Islands, 429 fathoms, globigerina ooze; bottom temperature, 53.3° F.

Family GONIOPECTINIDÆ.

GONIOPECTEN ASIATICUS, new species.

Differing from *G. demonstrans* in having a complete series of spines on both supero and inferomarginal plates and open cribriform organs between the proximal marginals. R = 135 mm., r = 27 mm., R = 5 r; breadth of ray at base, 31 mm. Disk moderate; rays long, robust, with vertical sides. Marginal plates massive, with fasciolar grooves containing cribriform organs, these proximally open as in Porcel-

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lanasteridæ. Paxillæ large, crowded, with upward of 60 short subequal spinelets on rather high tabula. Adambulacral plates with 6 to 10 furrow spines; the adoral conspicuously enlarged on proximal plates; also with 1 or 2 prominent subambulacral spines distally, and 5 to 8 proximally.

Type.—Cat. No. 30506, U.S.N.M.

Type-locality.—Station 5121, east coast of Mindoro, Philippine Islands, 108 fathoms, dark-green mud.

Genus PRIONASTER Verrill.

KEY TO KNOWN SPECIES OF PRIONASTER.

a^1. A specialized subambulacral spine present; inferomarginal spines well developed and present on all the plates.

b^1. Superomarginal spine conspicuous and present on all the plates; paxillæ small.

c^1. R equaling not more than 5 r; distal superomarginals apparently in contact medially; madreporic body small with transverse striæ; cribriform organs of interbrachium only slightly open; odd interradial double series of actinal intermediate plates narrow at inner end, the series not wedge shaped; first adambulacral plate perceptibly compressed; 10 or 11 furrow spines. ..... *analogus*.

c^2. R equaling more than 6 r; distal superomarginals not in contact medially; madreporic body large with radiating striæ; cribriform organs open; odd interradial double series of actinal intermediate plates wide at inner end, the combined series wedge-shaped; first adambulacral not compressed; 12 or 13 furrow spines..... *gracilis*.

b^2. Superomarginal spine absent or very small and present only on a part of the plates; paxillæ very large; madreporic body large with radiating striæ; cribriform organs moderately open; paxillar area reaching terminal plate. ..... *megaloplax*.

a^2. No specialized subambulacral spines; inferomarginal spines poorly developed and only on part of the plates; paxillæ moderately large; first adambulacral plate not compressed; 10 to 12 furrow spines..... *elegans* Verrill.

PRIONASTER ANALOGUS, new species.

Superficially resembling *Goniopecten asiaticus*, but with smaller paxillæ; differing from *P. elegans* Verrill in having smaller paxillæ, a complete series of marginal spines on both series, and a conspicuous subambulacral spine. R = 105 mm., r = 23 mm., R = 4.6 r; breadth of ray at base, 24 mm.; at eighth inferomarginal, 12 mm. Rays long, slender, tapering abruptly at base, then scarcely at all until near end; rays roughly rectangular in section, the 4 angles abruptly rounded; disk moderate; interbrachial arcs wide and open. Paxillæ rather small, close-set, the area being very narrow on outer two-thirds of ray, and almost obliterated for the length of the distal 10 or 11 supero-

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Type.—Cat. No. 30507, U.S.N.M.

Type-locality.—Station 5123, east coast of Mindoro, Philippine Islands, 220 to 283 fathoms, green mud.

PRIONASTER GRACILIS, new species.

Differs from *Prionaster analogus* in having conspicuously longer rays, with a distally wider paxillar area which reaches terminal plate; paxillæ with slenderer, sharper spinelets; superomarginals narrower abactinally; cribriform organs open and exposed proximally; longer marginal spines; more numerous adambulacral spinelets; first adambulacral not compressed; double series of interradial actinal plates wider at inner or central end; enlarged subambulacral on middle portion of ray only. R=165 mm., r=24 mm., R=6.9 r; breadth of ray at base, 24 mm., at tenth inferomarginal, 14 mm. Paxillæ small and crowded. Superomarginals 74, the distals about as wide as high (much wider than high in *analogus*). Cribriform organs much more open than in *analogus* and more as in *Goniopecten asiaticus*. In interbrachium the width of the exposed portion of organ (exclusive of marginal web) is a little over one-third height of superomarginal, or one-half lateral face of inferomarginal. Adambulacral plates angular as in *analogus*, but in midregion of ray not so strongly so and with 12 to 14 furrow spines, webbed for nearly half their length, the median spinelets slightly the longest. Four or 5 shorter spinelets on outer border of plate, immersed in membrane, one of them becoming a specialized subambulacral on the midregion of ray; not enlarged on distal or proximal part of ray.

Type.—Cat. No. 30508, U.S.N.M.

Type-locality.—Station 5425, Sulu Sea (lat. 9° 37′ 45″ N.; long. 121° 11′ E.), 495 fathoms, gray mud, coral sand; bottom temperature, 49.4° F.

PRIONASTER MEGALOPLAX, new species.

Differing from *Prionaster analogus* in the following features: Large compact paxillæ with very numerous spinelets; large madreporic body; superomarginals not in contact distally; superomarginal spines absent or rudimentary; more open cribriform organs; relatively larger inferomarginal spines; the odd interradial double series of actinal intermediate plates broader at inner end and with more plates; first adambulacral not markedly compressed; more numerous furrow spines. R=250 mm., r=50 mm., R=5 r; breadth of ray at base, 56 mm., at tenth superomarginal, 28 mm., at middle of ray, 20 mm. Paxillæ closely crowded, with stout pedicels, bearing each a flat-topped polygonal group of equal terete, blunt spinelets, about 25 to 30 occupying the periphery, and 20 to 40 the center. Superomarginals 74, the special spinule being either absent, or present as a small spinelet on the proximal half of ray. Inferomarginal spine

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longer than in *analogus* and about as in *gracilis*. Cribriform organs rather open in interbrachium the width of exposed area of fasciolar spinelets equaling one-fifth or slightly less the height of superomarginal. Adambulacral plates strongly angular, the adoral facet the shorter. Furrow spines 12 or 13, terete capitate, in a palmate series and basally webbed. A pointed, specialized subambulacral spine, situated on the outer aboral corner of plate is present, accompanied sometimes by a shorter companion, while 3 or 4 other shorter spinelets occur on the margin of plate, all immersed in membrane. Madreporic body very large, in diameter equal to length of first 3 superomarginals and situated twice its diameter from margin. Striæ fine, radiating from a point midway between center and adcentral margin.

Type.—Cat. No. 30509, U.S.N.M.

Type-locality.—Station 5624, between Gillolo and Makyan Islands, Molucca Islands (lat. 0° 12′ 15″ N.; long. 127° 29′ 30″ E.), 288 fathoms, fine sand.

Family ASTROPECTINIDÆ.

ASTROPECTEN ACANTHIFER PHRAGMORUS, new subspecies.

Very similar to *A. acanthifer* Sladen, but differing in having narrower rays, more perpendicular superomarginals, bearing larger spines on the extreme upper and inner edge of plate (not spaced conspicuously therefrom); a relatively longer actinal inferomarginal spine, and longer marginal spines generally (especially in proportion to width of ray); an incipiently enlarged subambulacral (more noticeable in young examples). R = 48 mm., r = 8 mm., R = 6 r; breadth of ray at second superomarginal, 9 mm.

Type.—Cat. No. 30510, U.S.N.M.

Type-locality.—Station 5157, vicinity of Jolo, Sulu Archipelago, 20 fathoms, sand and shells.

No species of the Indo-Pacific region, other than the well-known *Astropecten polyacanthus*, has the superomarginal spines as long as those of *phragmorus*. The spines slightly exceed in length the height of the plate and stand on the extreme upper end. They are also markedly stouter than in *acanthifer*.

The following four species of *Astropecten* are from deep water and are of slender habit, resembling *Astropecten pusillulus* Fisher and *A. griegi* Kœhler. The subjoined synopsis will serve to distinguish them from one another.

KEY TO SPECIES.

a^1. No superomarginal spines; paxillæ small delicate; abactinal spiniform pedicellariæ: furrow spines 4 or 5 ..... *eremicus*.

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b^2. Superomarginal spines on all except outer third of ray; subambulacral spines more than 5, one in the first series enlarged; mouth spines irregularly arranged.

c^1. No superomarginal or inferomarginal pedicellariæ; abactinal and adambulacral pedicellariæ very few; paxillæ medium-sized; superomarginals of proximal half of ray not longer than wide; lateral spines 3, sometimes 4.....*tenellus*.

c^2. Numerous abactinal, superomarginal, inferomarginal, and adambulacral pedicellariæ; superomarginals (except the first 8 or 9 plates) longer than wide; lateral spines 4, on distal third of ray, 3.....*pedicellaris*.

ASTROPECTEN EREMICUS, new species.

Disk small, rays flexible, and fairly long and slender; relation of R to r variable; in type R = 51 mm., r = 9 mm., R = 5.66 r; breadth of ray at base, 11 mm. Paxillæ small, not crowded, and with 5 to 8 delicate, blunt, membrane-invested spinelets borne on relatively high slender pedicels, the whole about 1 mm. high. Scattered over paxillar area, numerous pedicellariæ borne on special plates and with usually 4 spiniform jaws nearly as thick as the pedicel of a paxilla. Superomarginals (36 to 38) dorsal in position, the upper ends of inferomarginals forming margin of ray, and without special spines but covered with delicate spinelets invested in pulpy membrane. Inferomarginals about as wide as length of two; lateral spines 2, the upper the longer, and equaling about 2½ plates in length, and in addition, on the proximal half of ray, a shorter actinal spine near the adambulacral plates; adambulacral plates with 4 or 5 slender furrow spines, and 5 or 6 similar subambulacral spines in 2 longitudinal series; sometimes a subambulacral pedicellaria with 4 to 6 spiniform jaws is present. Mouth plates narrow with 4 enlarged teeth at inner angle of combined plates, and 3 or 4 spines of about the same size at the outer angle of each plate; between the 2 groups numerous smaller spinelets, decreasing in size from the median suture toward margin. Actinal intermediate pedicellariæ with 5 or 6 spiniform jaws.

Type.—Cat. No. 30511, U.S.N.M.

Type-locality.—Station 5491, Surigao Sea, between Leyte and Mindanao, 736 fathoms, green mud and coral; bottom temperature, 52.3° F.

The absence of superomarginal spines and the presence of abactinal, actinal intermediate, and subambulacral pedicellariæ will suffice to distinguish *eremicus* from *A. griegi* Kœhler. *A. eremicus* resembles *A. pusillulus* of the Hawaiian Islands, but the latter has 3 furrow spines, the much flattened median spine being stouter and wider than in *eremicus;* shorter paxillar pedicels and shorter spinelets; no actinal inferomarginal spinule in addition to the 2 lateral spines (except sometimes on the first 2 or 3 plates); shorter rays and relatively larger disk; no abactinal pedicellariæ.

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ASTROPECTEN LUZONICUS, new species.

Similar to *A. eremicus*, but with longer, narrower rays, a small tubercular spine on the first few superomarginal plates; only 3 furrow spines beyond the first 5 or 6 plates; armature of each mouth plate in 2 regular longitudinal series. Disk very small, rays long, slender, and very flexible; paxillar area narrow; paxillæ small, delicate; lateral spines 2 or 3; furrow spines 3; subambulacral spines 2 to 4, none enlarged. R = 68 mm., r = 9 mm., R = 7.55 r; breadth of ray at base, 9 to 10 mm.

Type.—Cat. No. 30512, U.S.N.M.

Type-locality.—Station 5112, Balayan Bay, southern Luzon, 117 fathoms, dark green mud; bottom temperature, 52.4° F.

In this species the paxillæ are small and slender as in *eremicus* with 5 to 8 slender, blunt, membrane-invested spinelets, as long as or slightly longer than the pedicel. Abactinal pedicellariæ very few and inconspicuous. Superomarginal plates, about 55 in number, are similar to those of *eremicus* in form and position, but the central spinelets are not sharp and squamiform as in *eremicus;* rather they are blunt and clavate or cylindrical, and the first 5 to 10 plates bear at the upper end of the plate, slightly spaced from the inner edge, a small upright conical sharp spine, which rapidly decreases in size and merges into the spinelets. Inferomarginal spines similar to those of *eremicus*, but the small actinal spine is lacking except rarely on the first 2 or 3 plates. No subambulacral pedicellariæ; each actinal interradial area with 5 or 6 pedicellariæ having 4 to 6 spiniform jaws. The mouth plates are similar to those of *eremicus*, but the spines are in 2 definite, regular, longitudinal series on each plate.

ASTROPECTEN TENELLUS, new species.

Very similar to *Astropecten griegi* Kœhler, from which it differs in having a few abactinal pedicellariæ among the paxillæ, in lacking a special spine on the distal superomarginals, in having very sharp, flattened, inferomarginal spinelets, and proximally several spinules along the aboral edge of the inferomarginal plates, ventral to the lateral spines; in having the median furrow spine conspicuously flattened, not cylindrical, in having, proximally, adambulacral pedicellariæ. Disk small, rays long and slender. R = 108 mm., r = 10 mm., R = 10.8 r; breadth of ray at base, 11 mm.

Type.—Cat. No. 30513, U.S.N.M.

Type-locality.—Station 5453, Albay Gulf, east coast of southern Luzon, 146 to 200 fathoms.

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upper end and aboral margin; this is lacking on the terminal fourth or fifth of ray. Inferomarginals with 3 or 4 conspicuous slender, flattened, sharp lateral spines, and continuing this to the inner end of plate are, on the proximal plates, 3 to 5 shorter, slenderer spinules. The furrow spines are 3, rather long, the median slightly the longest, flattened, saber-shaped, and pointed, the other 2 more cylindrical, slenderer, tapering, and pointed. Subambulacral spines: Back of the furrow series a slightly oblique longitudinal series of 3, the aboral the largest, and usually longer than the median furrow spine; the others are decreasingly shorter; back of these, 3 to 5 shorter, slenderer spinelets. Actinal intermediate plates few, with a tuft of spinelets or a conical spiniform pedicellaria.

ASTROPECTEN PEDICELLARIS, new species.

Similar in general appearance to *A. tenellus*, but differing in having abundant abactinal and adambulacral pedicellariæ, as well as pedicellariæ on supero- and inferomarginal plates, smaller paxillæ, narrower superomarginal plates, and more prominent lateral spines, which are 4 in number except on outer third of ray, where 3 are present. Rays long and slender; paxillar area narrow. R = 74 mm., r = 9 mm., R = 8.2 r; breadth of ray at base, 9 to 10 mm.

Type.—Cat. No. 30514, U.S.N.M.

Type-locality.—Station 5424, Sulu Sea, off Cagayan Island, Cagayanes Islands, 340 fathoms, coral sand; bottom temperature, 50.4° F.

The paxillæ are similar to those of *A. eremicus*, with a central, terete, blunt spinelet, usually as long as or a trifle longer than the pedicel, and 8 or 9 similar ones in a peripheral series. Scattered over the paxillar area are numerous conical pedicellariæ with 3 to 6, tapering, spiniform jaws which are slightly longer than the pedicels of paxillæ. Superomarginals of proximal three-fourths of ray with a conical sharp spine about as long as the plate, and most of the plates bear near the center a low dome-shaped fasciculate pedicellaria composed of 4 to 8 slightly modified stubby spinelets. Lateral spines 4, or 3 on outer third of ray; and on inner third, 1 or 2 shorter, slenderer, but well-developed spinules on the actinal surface. The uppermost, or the second, is the longest and proximally equals 2½ plates. Most of the proximal plates bear a small fasciculate pedicellaria at the upper end, near the base of the first spine; and on the ventral surface of nearly all the plates are 1 to 3 similar but larger pedicellariæ. Furrow spines 3, the median compressed and thin. Inner row of subambulacral spines, 2 or 3, the aboral member enlarged, tapering, slender, flattened, blunt-pointed, and a little longer than the median furrow spine; behind these are 3 to 5 shorter spines. Instead of this arrangement many plates have the subambulacrals nearly equal and grouped to form a pedicellaria with 4 to 6 jaws.

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CTENOPLEURA, new genus.

Allied to *Astropecten*, but differing in having the gonads in a crowded series parallel to the marginal plates, and extending about a third the length of ray; inferomarginal plates with a lateral, oblique, compact comb of 3 to 5, usually 4, slender appressed spines, closely resembling the lateral comb of *Persephonaster*, and in addition 1 to 5 flattened, appressed spines on the actinal surface; adambulacral plates with usually 4 or 5 furrow spines (or, on the second and third plates, sometimes 6 or 7) instead of 3, the usual number in *Astropecten*; subambulacral spines small, none enlarged; often a fasciculate subambulacral pedicellaria is present; Polian vesicles 5. Other characters as in *Astropecten*.

Type of the genus.—*Ctenopleura astropectinides*, new species.

This genus includes also *Astropecten ludwigi* de Loriol, of Japan, in which the gonads are arranged in series extending about a third the length of the ray. In *Astropecten* the gonads form a single tuft on either side of the interbrachial septum. The arrangement of the gonads in series will separate *Ctenopleura* from *Leptychaster*, *Bathybiaster*, *Psilaster*, *Blakiaster*, *Astromesites*, *Ctenophoraster*, *Persephonaster*, *Tritonaster*, and *Patagiaster*, while the very restricted development of the actinal intermediate plates will distinguish it from other Astropectinidæ having serially arranged gonads, such as *Anthosticte*, *Tethyaster*, *Thrissacanthias*, *Dipsacaster*, and *Plutonaster*. The armature of the marginals will separate *Ctenopleura* from *Lonchotaster* and *Ripaster* in which the gonads are not described.

CTENOPLEURA ASTROPECTINIDES, new species.

Related to *C. ludwigi* (de Loriol)[1] but differing in having longer, narrower rays, shorter, stouter superomarginal spines confined to marginal angle of ray, strongly 4-lobed abactinal plates on papular areas, and fewer actinal inferomarginal spines. R = 129 mm., r = 25 mm., R = 5r; breadth of ray at base, 28 mm. Disk small, rays long, narrow, very gradually tapering to a bluntly pointed extremity; abactinal integument thin, paxillæ tall, spaced, bearing a compact upright group of 10 to 15 subequal, terete, slender, blunt spinelets varying from slightly shorter to slightly longer than the cylindrical, barrel-shaped, or compressed pedicels; superomarginals encroaching conspicuously upon abactinal area, the dorsal face tumid and about twice as wide as the lateral; marginal area of plates covered with short, slender, crowded spinelets, becoming coarse roundish granules

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conical spinules; the first and 3 or 4 last plates without spinules; inferomarginals proximally as wide as length of 3, slightly arched, but actinal surface not at all strongly beveled; outer end armed with oblique comb of 4 slender, sometimes slightly curved, closely placed, appressed spines, the lowest or next to lowest the longest and about 1½ to 1¾ plates in length; spaced from these are proximally 2 spaced, flattened, sharp spines nearly as long as longest lateral spine; general surface covered with squamiform spinelets often spatulate in form; adambulacral plates with 4 (proximally 5 or 6 and distally sometimes 3) rather long, flattened spines, the laterals subtruncate or round-tipped; subambulacral spinelets proximally 12 to 16, subequal, slender, often flattened and only about half as long as median furrow spine; most of the plates with a conspicuous fasciculate pedicellaria, made up of 6 or 8 of the subambulacral spines; on each ray 7 or 8 actinal intermediate plates in a single row, armed with slender papilliform spinelets and sometimes a central lanceolate appressed spine; an occasional proximal plate with a fasciculate spiniform pedicellaria.

Type.—Cat. No. 30515, U.S.N.M.

Type-locality.—Station 5520, 4.5 miles southwest of Point Tagolo Light, north coast of Mindanao, 102 fathoms; bottom temperature, 61.3° F.

CTENOPHORASTER DIPLOCTENIUS, new species.

Very closely resembling *C. hawaiiensis* in general appearance, but differing in having no median radial area of smaller irregularly arranged paxillæ; in having the paxillæ in regular curved transverse series on rays, with fewer paxillæ to the series than in *hawaiiensis;* in having finer superomarginal spinelets and more numerous, minute, superomarginal fasciculate pedicellaria; in having slenderer and fewer inferomarginal spines, arranged in 2 oblique arcuate lateral series, and 1 transverse actinal series (not 3 and 2, respectively, as in *hawaiiensis);* in having tiny inferomarginal and numerous prominent actinal intermediate and subambulacral fasciculate pedicellaria; in having fewer subambulacral spines, and prominent central spines to the actinal interradial plates. R = 105 mm., r = 15 mm., R = 7r; breadth of ray at base, 18 or 19 mm.

Type.—Cat. No. 30516, U.S.N.M.

Type-locality.—Station 5272, China Sea, vicinity of southern Luzon (lat. 14° N.; long. 120° 22′ 30″ E.), 118 fathoms, mud, shells, coral sand; 1 specimen; bottom temperature, 57.4° F.

PSILASTER GOTOI, new species.

R = 58 mm., r = 14 mm., R = 4.1 r; breadth of ray at middle of interbrachium, 16 mm.; at third superomarginal, 13.5 mm. Disk fairly large, rays evenly tapered to a pointed extremity; interbrachia

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with 2 series, one near the upper end of the plates and the
the lower; adambulacral plates with 7 or 8 furrow spines p
and about 10 subambulacral spines in 2 series; mouth pl
horizontal fan of 4 prominent teeth. Differs from *P*
(Kœhler) in having only 1 superomarginal series of spine
defined central naked area on inferomarginals, and in
superomarginals less conspicuous, dorsally, and the infer
practically confined to the sloping side wall of ray; fur
slightly more numerous.

Type.—Cat. No. 30517, U.S.N.M.

Type-locality.—Station 5468, Lagonoy Gulf, southeast
569 fathoms, green mud.

This, as well as the following form, come within the
group *Phidiaster* of Kœhler.

The species is named in honor of Dr. Seitaro Goto, of th
University, Tokyo.

PSILASTER ROBUSTUS, new species.

R=30 mm., r=9.5 mm., R=3.15 r; breadth of ray
mm.; height of combined marginal plates at middle of inte
6 mm.; disk large, rays stout and short, evenly tapere
marginal plates very massive, encroaching conspicuo
paxillar area, than which they are wider at middle of r
small, spaced; one series of superomarginal spines; on
lateral inferomarginal spines and an incomplete second
series at base of ray; marginal plates covered with squa
without naked areas; furrow spines 6 or 7. Differing fro
in having much more massive superomarginals, which enc
upon paxillar area, smaller paxillæ, thicker terminal pl
complete series of inferomarginal spines, shorter and m
suboral spines, slightly shorter adambulacral spines, and
more robust, form.

Type.—Cat. No. 30518, U.S.N.M.

Type-locality.—Station 5632, south of Batjan Island
Islands (lat. 1° S.; long. 127° 50′ E.), 845 fathoms.

The paxillar area is sunken below the level of the b
superomarginal border, the paxillæ being small, with
coordinated, close-set spinelets on the largest plates of
portions of disk. The superomarginal spine is near the in
the first 2 plates, but on the third is about twice as far fro
edge, and on the fourth stands on the rounded border b
dorsal and lateral faces of the plate. Beginning with th
third inferomarginal plates is a row of sharp, prominen
spines, slightly larger than the superomarginal, extendi

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tip of ray. The first 3 to 6 plates bear a similar smaller spine, spaced from the lower end of the plate one-fifth to one-third width of plate. Surface of plate is covered with spaced squamules. Furrow spines 6 or 7, compressed, blunt, the median with edge to furrow; subambulacral spines 8 or 10, much shorter, clavate, thick, pulpy, and papilliform, in 2 series.

The absence of a second series of superomarginal spines and of naked areas on the marginal plates will separate *robustus* from *agassizi*. The inferomarginals of *agassizi* have a well-developed ventral face, while in *robustus* they form a steeply sloping side to the ray when viewed from below, there being no separate ventral and lateral faces.

ASTROMESITES, new genus.

Resembling *Persephonaster* and *Psilaster* in form, but differing from them and resembling *Leptychaster* and *Blakiaster* in the armature of the adambulacral and mouth plates, and especially in the possession of an odd interradial series of actinal intermediate plates. Differing from *Blakiaster* in having abactinal plates compact, independent, true paxillæ and in having well-developed marginal fascioles. Marginal plates massive, the inferomarginals with an appressed comb of slender spines; superomarginals unarmed; paxillæ large, flat-topped, crowded; actinal intermediate plates extending in a single series far along ray; adambulacral plates with an angular furrow margin bearing a divergent group of 5 to 7 spines and numerous subambulacrals, as in *Leptychaster;* mouth plates with extensive, convex surface; 3 series of crowded suborals, graded in length from the straight, even furrow series of long spines, which are graduated toward 2 inner teeth; no sharp-angular furrow series as in *Persephonaster;* disk small, rays stout, rather slender; actinal interradial areas small, the intermediate plates extending two-thirds the length of ray.

Type of the genus.—Astromesites compactus, new species.

ASTROMESITES COMPACTUS, new species.

R = 78 mm., r = 17 mm., R = 4.6 r; breadth of ray at base, 20 mm. Disk small, rays narrow but stout, tapering regularly to a pointed but not attenuate extremity; sides of ray fairly high, rounded; marginal plates massive; interbrachial angle abruptly rounded; paxillæ large, crowded, with numerous, short, crowded, blunt spinelets; superomarginals unarmed; inferomarginals with lateral comb of 4 to 6 appressed spines; marginal fascioles rather deep, abrupt, and narrow, furrow series angular, of 5 to 7 spines; mouth plates with straight, numerous, furrow series, and 3 series of suborals; interradial areas small, an odd interradial series of intermediate plates, and a single series far along ray; no pedicellariæ.

Type.—Cat. No. 30519, U.S.N.M.

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Mindoro (lat. 13° 41′ 50″ N.; long. 120° 58′ 30″ E.), 172 fathoms, broken shells, sand.

Astromesites differs from *Persephonaster*, *Psilaster*, and *Bathybiaster* in having an odd interradial series of actinal intermediate plates. It differs further from *Persephonaster* in lacking the latter's characteristic angular marginal series (or fasciculate group) of oral spines, and in having an angular series of furrow spines, rather than a comb; from *Psilaster* in having broader mouth plates with numerous, crowded suboral spines in more than 1 series, an angular (not pectinate) furrow armature, and in lacking the thick, fleshy, actinal spinelets; from *Bathybiaster* in lacking lobes on the abactinal plates, fleshy actinal spinelets, and in having a different type of dental and marginal armature. *Astromesites* agrees with *Blakiaster* and *Leptychaster* in having the odd interradial series of actinal intermediate plates, and the same type of adambulacral armature. It differs from *Blakiaster*, however, as indicated in the diagnosis, and from *Leptychaster* in having armed inferomarginals of the type of *Psilaster* and *Persephonaster*. I should be inclined to rank *Astromesites* with *Blakiaster* were not the abactinal plates wholly different.

Genus PERSEPHONASTER Alcock.

KEY TO THE SPECIES OF PERSEPHONASTER HEREIN DESCRIBED.

a^1. Marginal plates broad and conspicuous, the inferomarginals forming a wide bevel to actinal surface and bearing, on the outer tumid end, which projects laterally beyond superomarginals, a prominent comb of slender spines, covering, at least proximally, a second smaller parallel comb; superomarginals with a transverse series of appressed spines or spinules.

b^1. With several spines on the actinal surface of inferomarginals in addition to the lateral comb.

c^1. Rays broad and petaloid, abruptly narrowed to a very attenuate extremity; paxillar area broad; actinal intermediate plates extending fully two-thirds the length of ray, and larger; inferomarginal plates wider; superomarginal spines more prominent and numerous..... *euryactis*.

c^2. Rays narrower, evenly tapered; paxillar area narrower; actinal intermediate plates extending a little over one-half length of ray, and very small distally; inferomarginals narrower; superomarginal spinulesi nconspicuous.

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c^1. Superomarginals very tumid with the transverse ridge situated at middle of plate, and evenly rounded from inner to outer edge; furrow spines 9; marginal fan of oral spines, 3 or 4, not prominent.....*multicinctus.*

c^2. Superomarginals less tumid and with the transverse ridge situated between center and distal margin of plate; an appreciable angle between the dorsal and lateral surfaces; inferomarginals broader, with less crowded, slenderer squamules; furrow spines 7 or 8; marginal fan of mouth spines 5 to 7, prominent.....*suluensis.*

b^3. Marginals tumid, the inferomarginals being narrow and provided usually with an erect conical spine at upper end of plate, above the appressed, longer spines of the lateral comb; superomarginal spines in a single series along ray, passing from the inner edge of plate toward outer, after the fifth plate.
.....*monostœchus.*

a^3. Marginal plates not massive, the superomarginals being small, squarish, and tumid, with a spine near center, and sometimes on the outer part of ray more than 1; the inferomarginals narrow but with a well-marked actinal face; rays depressed; paxillæ rather spaced and delicate.

b^1. Rays broader; inferomarginals at base of ray about two-thirds to three-fourths as long as wide; no actinal series of spinules; more than 1 series of suboral spines, the mouth plates as a whole larger; marginal and subambulacral fasciculate pedicellariæ; furrow spines 6 or 7.....*ædiplax.*

b^2. Rays slenderer; inferomarginals narrower, the width not exceeding length, except on first 2 plates; 2 or 3 actinal inferomarginal spinules proximally, in addition to lateral comb; only 1 series of suboral spines; no marginal or adambulacral pedicellariæ; furrow spines 5 or 6.....*habrogenys.*

PERSEPHONASTER EURYACTIS, new species.

R = 92 mm., r = 23 mm., R = 4 r; breadth of ray at base, 24 to 26 mm. Rays depressed, broadly lanceolate, abruptly constricted near tip into a very attenuate, sharp extremity; interbrachium abruptly rounded-angular; superomarginal plates broader than long, and after the first half dozen, confined to abactinal surface; each tumid plate with a transverse, appressed comb of 3 to 7, flat, sharp spines; inferomarginals much broader than long, the outer tumid end bearing a comb of about 5 prominent, sharp spines; proximal plates with a second lateral comb of 3 to 5 spines covered by the first; curved furrow comb of 6 or 7 rather long spines; subambulacrals proximally about 6 in a single irregular series; actinal intermediate plates extending two-thirds length of ray.

Type.—Cat. No. 30520, U.S.N.M.

Type-locality.—Station 5297, Verde Island Passage, off Batangas Bay, Luzon (lat. 13° 41′ 20″ N.; long. 120° 58′ E.), 198 fathoms, mud and sand.

The paxillæ are medium sized, low, arranged in slightly oblique transverse series on rays, at the base of which 6 or 7 transverse series correspond to 2 superomarginals. The spinelets usually stand erect in a compact flat-topped roundish group, causing the paxillæ to be spaced about one-half their diameter apart. Fifteen to 20 peripheral and 10 to 15 central, slender, terete, blunt spinelets, longer than the stout pedicel, compose the crown of the larger paxillæ. Many of the

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paxillæ bear a central fasciculate or pectinate pedicellaria consisting of 4 to 8 jaws considerably stouter, but not much longer, than the regular spinelets. The median or outer admedian superomarginal spine is usually the longest, about equaling the length of plate. The lowest or next to lowest inferomarginal spine of the lateral comb is the longest, or the 3 lowermost subequal, and equal to the length of 2½ inferomarginal plates. Continuing this series along the distal margin toward the inner end of the plate are proximally 4 or 5 and distally 2 or 3 sharp, appressed, flattened, much shorter spines. The surface of the plate is covered with medium-sized, ovate, or obovate, imbricating, appressed squamules, with broad, rounded ends. They are specialized into a series of short, pointed spinules just adorally to the series of lateral spines. Adambulacral plates separated by wide sutures; furrow margin bearing a curved comb of 6 or 7 long, slender, compressed round-or squarish-tipped spines, the central 2 or 3 slightly the longest and with edge to furrow, the laterals with flat side thereto.

In the shape of the ray this species is like *P. cœlochiles*, but lacks the stout, erect, superomarginal spine, and has the abactinal plates irregular along the radial line. The inferomarginal plates of *euryactis* are wider, and in *cœlochiles* the second series of actinal intermediate plates extends far along the ray. The accessory actinal inferomarginal spines are lacking in *cœlochiles*.

PERSEPHONASTER ANCHISTUS, new species.

Similar to *P. euryactis*, but with slightly slenderer rays which taper evenly on the outer part to an attenuate extremity; actinal inferomarginal spines lacking except on the first few plates; superomarginal spines lacking on first 3 to 5 plates, and distally 1 to 3 in number; lateral comb of spines as in *euryactis*, but the second comb very poorly developed, usually represented by a single spine, behind one of the upper spines of the first comb; paxillæ arranged as in *euryactis* and of about the same size, but with slightly longer spinelets; abactinal pedicellariæ numerous, with jaws only slightly, sometimes not any, thicker than the surrounding spinelets; subambulacral spines slightly more numerous than in *euryactis*, in 2 or 3 longitudinal series. R = 143 mm., r = 34 mm., R = 4.2 r; breadth of ray at mid-interbrachium, 34 mm.

Type.—Cat. No. 30521, U.S.N.M.

Type-locality.—Station 5301, China Sea, vicinity of Hongkong (lat. 20° 37′ N.; long. 115° 43′ E.), 208 fathoms, gray mud, sand; bottom temperature, 50.5° F.

PERSEPHONASTER LUZONICUS, new species.

Resembling in armature a short-spined variety of *P. euryactis*, but

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brachium, about 20 mm.

Type.—Cat. No. 30522, U.S.N.M.

Type-locality.—Station 5326, off northern Luzon (lat. 18° 32′ 35″ N.; long. 122° 01′ E.), 230 fathoms, mud; bottom temperature, 55.4° F.

The most striking difference between this species and a less spinous variety than the typical *P. euryactis* is in the narrower rays, which instead of being rather broad near the tip and then quickly narrowing to an attenuate extremity, taper gradually from a narrower base. The superomarginals are of the same width in the two species and as a consequence the paxillar area is much narrower in *luzonicus*, its width at one-third R from center being one and two-thirds to slightly less than twice the extreme width of a neighboring superomarginal, and at two-thirds R, about as wide as the superomarginals. In *euryactis* these proportions are respectively 2½ to 2¾, and 1¾. Adambulacral armature similar to that of *P. euryactis*, but furrow spines 7 or 8, the eighth being usually a shorter spine at the adoral end of the series. Proximally, 8 or 9 subambulacral spines, slender, terete, blunt, much shorter than the furrow spines, and in 2 longitudinal series; distally, 10 or 12 spinules similar but relatively a little shorter in 2 series, with often the beginning of a third, on the outer part of the plate. The actinal intermediate plates, owing to the narrowness of the ray, are very small beyond the proximal third or fourth of the ray.

PERSEPHONASTER TENUIS, new species.

A slender-rayed species with block-like conspicuous marginals, which are not markedly tumid as in the "cingulate" species such as *multicinctus*, *cingulatus*, and *roulei;* superomarginals with slightly wider dorsal than lateral face; lateral face of ray perpendicular, the upper and lower margin evenly and abruptly rounded; superomarginal plates without conspicuous spines; inferomarginals narrow, with lateral comb of, proximally, 5 rather short slender appressed spines, and 1 actinal spinule on the proximal plates only; furrow spines 7 or 8; subambulacrals 4 to 7 proximally, distally 8 to 10; a few fasciculate adambulacral pedicellariæ. R = 81 mm., r = 18 mm., R = 4.5 r; breadth of ray at base, 20 mm.; at tenth superomarginal, about 11 mm.

Type.—Cat. No. 30523, U.S.N.M.

Type-locality.—Station 5301, China Sea, vicinity of Hongkong (lat. 20° 37′ N.; long. 115° 43′ E.), 208 fathoms, gray mud, sand.

This species differs from *luzonicus* in having still narrower rays; superomarginals which encroach less upon the paxillar area, and have proportionately higher lateral faces; more delicate superomarginal spinelets; practically no specialized spines, except a very small one

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on the distal plates; actinally narrower inferomarginal plates with only 1 small actinal spine on a few proximal plates; shorter lateral spines; more restricted actinal intermediate plates; adambulacral pedicellariæ; proximally fewer subambulacral spines; longer and slenderer terminal plate.

PERSEPHONASTER MULTICINCTUS, new species.

Of the type of *P. cingulatus* Fisher and related to *P. roulei* Kœhler, from which it differs in having abactinal and marginal pedicellariæ; fewer paxillar spinelets; a slender appressed, central superomarginal spine, forming a single longitudinal series along ray (not 2 conical robust ones, forming 2 parallel series along ray); more numerous furrow spines. Disk larger than in either *cingulatus* or *roulei*. R = 110+mm. (tip of ray broken), r=24 mm., R=4.6+r; breadth of ray at base 28 mm. Interbrachia open; rays tapering very gradually; height of ray at base less in proportion to width than in *cingulatus* or *patagiatus*. Paxillæ small, with a low pedicel surmounted by a flat-topped group of upward of 12 peripheral and 5 to 7 central terete, blunt, spinelets as long as or slightly longer than height of tabulum; scattered abactinal fasciculate or fasciculate-pectinate pedicellariæ with 2 to 10 spiniform jaws markedly stouter than paxillar spinelets. Superomarginals over 40, shaped as in *P. cingulatus*, the median transverse line being covered with scale-like granules, the slopes on either side with tiny terete spinelets. Except for 6 or 7 interbrachial plates each plate bears near the middle 1 or 2 slender appressed, sharp flattened spinules (but forming a single series along ray); several inconspicuous fasciculate pedicellariæ present on each plate. Inferomarginals with a lateral oblique comb of 3 or 4 slender, flat, sharp appressed spines. Actual interradial areas small, each triangle with about 10 or 12 slender, elongate spines and a very few fasciculate pedicellariæ. Adambulacral plates with a curved furrow margin, 9 furrow and 2 longitudinal series of subequal slender, membrane-covered, rather fleshy, subambulacral spines, about 5 in the inner series and 4 to 7 slightly shorter ones in the second.

Type.—Cat. No. 30524, U.S.N.M.

Type-locality.—Station 5648, Buton Strait, Celebes (lat. 5° 35′ S.; long. 122° 20′ E.), 559 fathoms, green mud; bottom temperature, 39.2° F.

PERSEPHONASTER SULUENSIS, new species.

Near *P. multicinctus*, but differs in having the superomarginal plates

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lacral furrow spines. R = 61 mm., r = 14 mm., R = 4.3 r; breadth of ray at base, about 16 mm.

Type.—Cat. No. 30525, U.S.N.M.

Type-locality.—Station 5424, Sulu Sea, near Cagayanes Islands, 340 fathoms, coral sand; bottom temperature, 50.4° F.

This species is similar, also, to *P. tenuis*, but differs in the presence of the conspicuous though small superomarginal spine, the wider inferomarginals, the much less compressed first adambulacral plates, the longer and more numerous marginal mouth spines, the proximal subambulacrals in 2 series, and the specialized abactinal pedicellariæ.

PERSEPHONASTER ŒDIPLAX, new species.

Marginal plates small and tumid, the superomarginals bearing a central small spine, or distally 2; the inferomarginals extending laterally slightly beyond superomarginals, the tumid outer end bearing a narrow comb of 3 or 2 slender appressed spines; no actinal inferomarginal spines; superomarginal, inferomarginal, abactinal, actinal intermediate, and subambulacral fasciculate pedicellariæ; furrow spines 6 or 7, rather long, slender, compressed; subambulacral spines 8 to 12, slender and short. Rays long, of medium width, thin, and with attenuate extremity. R = 95mm., r = 20 mm., R = 4.75 r; breadth of ray at base, 22 mm.; breadth at two-thirds of r, 8 mm.

Type.—Cat. No. 30526, U.S.N.M.

Type-locality.—Station 5123, east coast of Mindoro, 220 to 283 fathoms, green mud.

The superomarginals, 40 in number, are quite small, and form a narrow border to the paxillar area, the inferomarginals extending laterally beyond them and forming a scalloped margin to ray. In the interbrachial angle the plates are wider than long, then they become square, and beyond the first third of the ray the length gradually increases over the width, as the plates become smaller and smaller. The plates are tumid, the apex of the tumidity bearing a short conical spine and moving from the middle of the plate (at base of ray) to a little distad of the middle. On the outer fourth of the ray the plates are not tumid and have 2 or 3 spines in a transverse series. The plates are covered with a fine nap of very delicate spinelets, becoming appressed around the base of the spine, and most of them have 1 or 2 small fasciculate pedicellariæ near the inner edge. Inferomarginals on first third of ray equal in width to 1½ the length; at middle of ray the width only slightly exceeds the length. From this point the ray becomes rapidly very attenuate, and the plates are longer than wide, most of the width being occupied by the actinal face, the lateral facet being low, tumid, and armed with a short oblique comb of 3, distally often 2, slender, tapering, sharp. appressed

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spines, the middle or the 2 lower the longest. At the first third of the ray the longest spine equals 2 or 2½ plates and the comb often is largely abactinal in position, the spines resting on or against the superomarginals. The plates are covered with spaced, rather slender, flattened, appressed spinelets, sometimes squamiform, and the first few plates usually have 1 or 2 fasciculate pedicellariæ near the inner edge, and another at the outer end, near the base of the uppermost lateral spine, this upper pedicellaria persisting to the outer part of the ray.

P. œdiplax differs from such species as *euryactis*, *anchistus*, and *luzonicus* in having much narrower and more tumid superomarginals, each of which bears a subcentral conical spine, not an appressed spine or row, near the distal border of the plate. *P. œdiplax* differs from *P. tenuis* in having much smaller and more tumid, armed, superomarginals, and less massive inferomarginals. The side of the ray of *tenuis* at the base is massive and high—higher than the actinal width of the inferomarginals, while in *œdiplax* the border of ray is low, equal to or less than actinal width of the inferomarginals. The ray is slenderer in *tenuis* and the paxillar area much narrower, the paxillæ larger, the lateral spines more numerous, and the actinal inferomarginal spinelets squamiform. *P. multicinctus* belongs to another type, having massive, transversely tumid superomarginals, narrow paxillar area, large independent abactinal pedicellariæ, larger paxillæ, and numerous furrow spines. *P. suluensis* also has a massive margin to the ray, the superomarginals, especially, being larger than in *œdiplax* and the side wall of ray higher. The paxillar area in *suluensis* is narrower, and conspicuous, independent, abactinal pedicellariæ are present. Actinally the most conspicuous differences are the wider inferomarginals and longer marginal mouth spines of *suluensis*, and the slenderer inferomarginal spinelets and conspicuous inferomarginal pedicellariæ of *œdiplax*.

PERSEPHONASTER HABROGENYS, new species.

Resembling *P. œdiplax* but with still slenderer rays, smaller disk, narrower inferomarginal plates, which bear proximally 2 or 3 actinal spinules in addition to the 2 or 3 slender, long, lateral spines; with very small actinal interradial areas, the plates extending less than half the length of ray; mouth plates small, with 2 series of suboral spines; adambulacral plates spaced, with 5, less often 6, furrow spines. Superomarginal spines proximally 1, distally 2 or 3, the

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Type-locality.—Station 5114, Balayan Bay, southern Luzon, 340 fathoms, fine sand.

The inferomarginal plates extend slightly beyond the superomarginals and are very narrow, with a tumid outer end, as in *œdiplax*. Except for the first 2 or 3 plates, which are wider than long, all the plates are either as wide as long (to about the middle of ray) or narrower than long (outer half of ray). For this genus the inferomarginals are very narrow and form a narrow, slightly beveled border to the actinal area. Lateral spines proximally 3 (with sometimes a slenderer fourth spine at the upper end of the series), distally 2, slender, slightly curved, appressed, the lowest the longest, and equaling 2½ to 2¾ plates in length on the proximal half of the ray. On the distal margin of the narrow actinal facet of the plate 2 or 3 much smaller, very slender spinules continue the lateral series. These become so small on the outer third of ray that they merge into the general spinulation, and owing to the extreme narrowness of the plates the lateral comb occupies the whole width. The spinelets covering the outer or lateral face of the plate are delicate, terete, and upright like those of the superomarginals, but actinally they become coarser, sharper, and well spaced. There may be on the proximal plates an additional enlarged spinule near the adoral margin. Several plates in the interradial area, adjacent to the adambulacrals, bear prominent fasciculate pedicellariæ with 4 to 6 swollen spiniform jaws, the calcareous portion being very slender. The furrow spines are 5, or occasionally 6, long, slender, compressed, pointed, membrane-invested, and webbed at base, forming a regular comb with a curved outer margin. The mesial spines are about as long, on the proximal third of the ray, as the neighboring inferomarginal plate. Subambulacral spines very slender, terete, but apparently thick and swollen owing to the translucent tissue investing them. There are about 6 of these forming 2 series on the second and third plates, then on the succeeding plates a single zigzag series, and finally on the outer half or two-thirds of the ray 2 more or less irregular series of 8 to 12 spinules.

This species is an aberrant *Persephonaster* in that its marginal and mouth plates are distinctly smaller than the mean for the genus, and the general habit is slender. The actinal interradial areas are unusually small, and the furrow spines of the adambulacral plates reach the lowest number known in the genus. *P. habrogenys* agrees with *P. gracilis* (Sladen) (formerly *Psilaster gracilis*) in having small mouth plates, but differs in possessing armed superomarginals, smaller disk, higher paxillæ; in having the lateral and ventral facets of the inferomarginals better differentiated, and the long inferomarginal spines lateral in position; in having fewer furrow spines.

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PERSEPHONASTER MONOSTŒCHUS, new species.

Related to *P. croceus* Alcock and Wood-Mason, which it resembles in having, in addition to the appressed inferomarginal spines, a conical erect lateral spine, but differs in having only 1 series of erect superomarginal spines (peculiarly situated), narrower marginals, 8 furrow spines, small actinal interradial areas, and irregularly occurring and smaller, erect, lateral spines. R = 45 mm., r = 8.5 mm., R = 5.3 r; breadth of ray at base, 12 mm. Rays rather slender, with proximally high, lateral walls sloping steeply but not quite perpendicularly; marginal plates massive, tumid, the superomarginals encroaching conspicuously upon the abactinal surface beyond the base of ray. Interbrachial angle abruptly rounded.

Type.—Cat No. 30528, U.S.N.M.

Type-locality.—Station 5606, Gulf of Tomini, Celebes, 834 fathoms, green mud.

The paxillæ are comparatively large, though having on an average 15 to 18 pointed, slender spinelets about as long as the convex tabulum, 3 to 5 occupying the center. Paxillæ are largest in the interradial regions and adjacent portions of ray, base of tabulum roundish on disk but on ray the plate as well as section of tabulum is elongate-elliptical. On radial region of each ray are several large fasciculate pedicellariæ sometimes broader than paxillæ, composed of 4 to 8 pointed tapering spinelets, much stouter than those of paxillæ, and springing from low plates resembling reduced paxillæ. First 4 or 5 superomarginals with the single upright conical spine practically on upper edge of plate, but with the fifth plate the spine recedes from the inner edge and more and more of the surface of the plate is abactinal. With the eighth or ninth plate the 2 facets are about equal, but distally from this point the dorsal becomes much the wider and the spine which keeps on the well rounded margin between the 2 facets gradually becomes horizontal and has the appearance of being a lateral spine. There is no abrupt fasciolar channel between the plates, the surface sloping upward from either transverse suture to the median line, and the spine is on this ridge. All except the distal inferomarginals are tumid, the ridge of the superomarginals being continued across the lower series, and the ventral margin of the ray is so evenly rounded that the plate is regularly curved from the inner to outer edge. The armature is quite distinct from that of the foregoing species. Just below the outer or upper edge of the plate is a horizontal, erect, conical spine, a little smaller than the

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pressed and pointed, in a regular comb with a nearly straight distal margin. Superambulacral spinules 10 to 12, very slender, terete, pointed, in 3 irregular longitudinal series, or in 1 series of 5 near the furrow and the others without very definite order, the size grading from those of first series which are nearly as long as the furrow spines, to the outer, which are subequal to the actinal intermediate spinelets. Some of the proximal plates have fasciculate pedicellariæ with 3 to 5 shortened, sharp, spiniform jaws.

TRITONASTER EVORUS, new species.

R = 31 mm., r = 7 mm., R = 4.4 r; breadth of ray at base, 7.5 mm. Rays pointed, fairly stout, very evenly tapering from narrow base; interbrachia abruptly rounded; abactinal integument thin, slightly inflated; paxillæ small, largest on borders of paxillar area, to which the papulæ are confined; marginal plates massive; superomarginals forming a tumid border to paxillar area, each with a small conical upright spine; inferomarginals with very tumid outer ends bearing, proximally, 2 curved parallel combs of setalike spines (one covering the other) and, distally, 1 such comb; adambulacral plates with 3 long furrow, and 12 to 15 delicate subambulacral spines, the latter often forming fasciculate pedicellariæ. Differing from *T. craspedotus* in the much larger, tumid superomarginals, smaller paxillæ, double proximal combs of lateral spines, fewer adambulacral spines and fewer enlarged teeth.

Type.—Cat. No. 30529, U.S.N.M.

Type-locality.—Station 5476, off southeastern end of Luzon (vicinity of San Bernardino Strait), 270 fathoms, fine sand; bottom temperature, 48.3° F.

The paxillæ are rather low parapaxillæ, the summit of the tabulum being convex and narrower than the base. The larger paxillæ have 1 to 4 central, delicate, minutely thorny spinelets and 6 to 9 peripheral, while the small ones have 1 to 3 central and 5 to 8 peripheral. Superomarginal plates, 24 to a ray, are, unlike those of *craspedotus*, robust to the end of the ray, and are so shaped that they form a raised angular or tumid border to the paxillar area. The plates are wider than long, and each has a lateral and a dorsal face, the latter being about square, and the former longer than high beyond the basal fourth of ray. The general surface of plate is covered with well-spaced, tiny, upright spinelets, very fine about the borders of the plate and gradually becoming thimble-shaped at the center. On the lateral face of many plates are 1 or 2 small fasciculate pedicellariæ with about 6 tiny spinelets for jaws. The fascioles between the plates are very rudimentary. The inferomarginals have a very convex outer end, which defines the ambitus and bears a perpendicular, curved comb of delicate setalike spines. On the

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second to fifth plates this comb covers a second parallel comb of smaller spines, as in *Ctenophoraster*, and some species of *Persephonaster*. Proximally the first comb consists of about 5 larger spines, the third from the upper the longest; and, forming a continuous series with these on the distal margin of the actinal surface, 3 or 4 smaller and more delicate ones. Beyond the eighth or ninth plate only the lateral comb remains and consists of 5 or 4 spines, diminishing to 3 or 4 at the very tip of ray. Owing to the tumidity of the outer end of the plate, 2 or 3 of these spines are dorsal in position and are pressed against the sloping side wall of the superomarginals. The second comb is confined strictly to the first 4 or 5 plates, and to the outer end, forming a parallel series between the base of the regular comb and the distal edge of the plate.

DIPSACASTER DIAPHORUS, new species.

Similar in form to *D. sladeni* but differing in having short, thick, clavate, or subterete, thorny paxillar spinelets, more numerous adambulacral spinules, a small madreporic body, and less conspicuous marginal spinules; all the shorter spines and spinelets thorny; paxillæ with 20 to 25 spinelets; furrow spines 8 or 9, very slender, pointed, slightly compressed; subambulacral spinules 15 to 20 arrangeed in series, or forming a sort of rosette-like group on the convex surface of the plate; madreporic body small. Rays rather slender, disk large, interbrachia abruptly rounded. R=31 mm., r=10 mm., R=3 r; breadth of ray at base, 11.5 mm.

Type.—Cat. No. 30530, U.S.N.M.

Type-locality.—Station 5526, between Siquijor and Bohol Islands, Philippine Islands, 805 fathoms, green mud and globigerina; bottom temperature, 52.3° F.

The paxillar area is compact, and the paxillæ are comparatively large, with rather short pedicels crowned by a capitate group of 20 to 25 thick clavate or cylindrical, round-tipped, minutely thorny spinelets, about as long as the pedicels, and relatively fewer and thicker than usual in this genus. The superomarginals, 23 in number, are nearly square, abactinal in position, and covered with slightly spaced spinelets similar to those of the paxillæ. Inferomarginals corresponding to superomarginals plate for plate, and covered with spaced, appressed, slender, sharp, sometimes flattened and squamiform spinelets, becoming a tuft of longer spinules on the outer end. Two or 3 of these are larger than the rest, arranged in a transverse series, and are similar to the lateral spines of *D. sladeni*, though less

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PATAGIASTER SPHÆRIOPLAX, new species.

Differing from *P. nuttingi* Fisher in having shorter, broader rays, larger paxillæ with more numerous granules; in having the paxillæ in a definite radial, and parallel longitudinal series; in having broader marginal plates and slenderer actinal spinulation. R = 28 mm., r = 12 mm., R = 2.3 r; breadth of ray at base 13.5 mm. Disk large, rays short, tapering from wide rounded interbrachia to a pointed extremity; general form depressed; sides of ray rather thin, rounded; larger paxillæ with 30 to 40 elongate, regular, bead-like granules surrounded by a peripheral series of numerous, slender, short spinelets, some of which are intermediate in form with the central granules; furrow spines slender, pointed, slightly compressed, in a regular comb of 6, sometimes 7, the contour of the distal margin being curved; subambulacral spines 12 to 16 slender, terete, with prickly tips, usually in 3 longitudinal series, the 3 or 4 spines back of the furrow series being nearly as long as furrow spines; actinal intermediate plates with a conspicuous keel, and carrying a paxilliform group of 15 to 18 slender, rather long spinelets, those in the center the stoutest (longer and slenderer than in *P. nuttingi*).

Type.—Cat. No. 30531, U.S.N.M.

Type-locality.—Station 5178, vicinity of Romblon Island, Philippine Islands (lat. 12° 43′ N.; long. 122° 06′ 15″ E.), 78 fathoms, fine sand.

Genus DYTASTER Sladen.

KOREMASTER, new subgenus.

Differs from typical *Dytaster* in having a very weak abactinal integument, Astropecten-like paxillæ with well-developed pedicels and relatively long, slender spinelets; and in having the marginal fascioles well developed. Pedicellariæ, marginal armature, and adambulacral armature, gonads and alimentary system as in *Dytaster*. An odd interradial series of actinal intermediate plates, often irregular, is present and the madreporic body is smaller and less densely covered with paxillæ than in *Dytaster*.

Type of the subgenus.—Dytaster (*Koremaster*) *evaulus*, new species.

DYTASTER (KOREMASTER) EVAULUS, new species.

R = 62 mm., r = 15.5 mm., R = 4 r; breadth of ray at interbrachium 19 mm., at tenth superomarginal, 9 mm.; interbrachium arcuate or rounded-angular; rays arcuately tapering and narrow beyond the basal fourth; abactinal integument inflated; paxillæ well developed, often penicillate, with fairly tall pedicels and slender, pointed, thorny spinelets; abactinal, globose pedicellariæ; well developed marginal fascioles; marginal plates small, block-like, with a stout conical spine; actinal intermediate pedicellariæ; furrow spines much compressed, 7

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subambulacral pedicellariæ; first adambulacral plate compressed; marginal mouth spines much compressed.

Type.—Cat. No. 30532, U.S.N.M.

Type-locality.—Station 5606, Gulf of Tomini, Celebes, 834 fathoms, green mud.

This species is remarkable for the typical paxillæ and well developed marginal fascioles. It is not closely related to any described species. Among the forms dredged by the *Challenger* it shows most resemblance to *D. spinosus*, but has perpendicular sides to the ray, taller, more penicillate paxillæ, and characteristic pedicellariæ. These on the abactinal surface, resemble rather large globular granules split nicely into 3 to 5 sections.

The adambulacral plates are narrow, being much longer than wide, with a rounded furrow margin bearing 7 or 8 fairly long, bluntly pointed, compressed spines, widened and blade-like at the base, and sometimes rather abruptly constricted near the tip, the median spines being slightly the longest and all forming a vertical comb. Close to these on the surface of the plate is an irregular longitudinal series of 6 to 10 cylindrical, pointed spines of which one near the center is enlarged and subequal to or longer than the furrow spines. But on the outer part of the ray the other spines are abruptly smaller, one-half to two-thirds the length of the larger, and not clearly arranged in a series. Most of the plates bear 1 or 2 prominent pedicellariæ, with usually 3 jaws, slightly longer than those of the actinal interradial areas. The latter resemble, in miniature, flower buds with 4 to 8 fleshy petals, and are found on a majority of the actinal intermediate plates.

A large abactinal paxilla has 15 to 20 spinelets of which 3 to 5 stand on the convex top of the pedicel and the others, with a slight basal web, form a peripheral series. The paxillæ resemble, on a small scale, those of *Solaster papposus*.

Family GONIASTERIDÆ.

MIMASTER NOTABILIS, new species.

Differing from *M. tizardi* in having much slenderer rays, more numerous paxillar spinelets, more prominent paxilliform marginal plates, a narrower actinal intermediate area on ray, and fewer adambulacral spinelets. R = 104 mm., r = 35 mm., R = 3 r; breadth of ray at base, 39 mm. Paxillæ slightly spaced, with upward of 75 delicate, terete, pointed spinelets, either closely appressed in a cylindrical upright group, or radiating and forming a subglobose crown; marginal plates small, paxilliform, the inferomarginals the larger, about as high as the length of the base, and standing out horizontally from ambitus, the crown of spinelets compressed and

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wider than long; actinal intermediate plates in 10 or 11 very regular chevrons, and extending to the end of the ray; half way along ray about 5 actinal intermediate plates in a transverse series (8 or 9 in *tizardi*); intermediate plates with spaced cylindrical, upright paxilliform groups of slender spines; adambulacral armature resembling that of *M. tizardi*, but with 13 or 14 (instead of 15 to 20) spinelets, 2 or 3 of which, about 1½ plates in length, and considerably stouter than the rest, occupy the furrow margin.

Type.—Cat. No. 30533, U.S.N.M.

Type-locality.—Station 5630, vicinity of Batjan Island (south of Patiente Strait), Molucca Islands (lat. 0° 56′ 30″ S.; long. 128° 05′ E.), 569 fathoms, coral sand, mud.

PSEUDARCHASTER OLIGOPORUS, new species.

Nearest to *Ps. pectinifer* Ludwig and *Ps. dissonus* Fisher. R=87 mm., r=21 mm., R=4.1 r; breadth of ray at base, 24 mm.; rays slender, long, and very attenuate at the extremity; side of ray low, rounded; marginal plates small, especially distally, where superomarginals are confined to side wall of ray and are longer than wide, square, or slightly wider than long; papular area restricted to center of disk and petaloid radial areas extending about ⅓ the length of ray; abactinal plates tabulate on papular area, the roundish tabula low, spaced, and bearing 20 to 30 polygonal granules; outside of papular area, plates elliptical or oblong, arranged in oblique transverse series and with very low tabulum, or distally none; superomarginal plates with coarse, spaced, round granules; inferomarginals with pointed, conical, appressed spinelets, and proximally 8 to 12 appressed, sharp spines in a zigzag transverse series, these becoming reduced to 1 or 2 toward the extremity of ray; actinal intermediate plates in 5 chevrons, the series adjacent to adambulacrals with the transverse sutures armed with fasciolate pectinate pedicellariæ, the spinelets being short and broad-tipped; furrow series angular with 8 or 9 short, sometimes slightly compressed, blunt or bluntly pointed spines and 1 or 2 tapering, pointed, subambulacral spines, surrounded by 5 to 10 shorter, spaced, pointed spinelets.

Type.—Cat. No. 30534, U.S.N.M.

Type-locality.—Station 5609, Gulf of Tomini, Celebes (lat 0° 11′ S.; long. 121° 16′ E.), 1,092 fathoms, green mud; bottom temperature, 36.3° F.

This abyssal form differs from *Ps. pectinifer* and *Ps. dissonus* of

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plates on the paxillar area, the others being low and not tabulate; and shorter furrow spines.

The attenuate long rays and small marginals will readily separate *oligoporus* from *tessellatus*, *mozaicus*, *jordani*, *myobrachius*, and *pretiosus*. *Ps. roseus* (Alcock) from the Laccadive Sea, 740 fathoms, is a long-rayed form, R equaling 4 r. Kœhler states that in the type there are no inferomarginal spines, merely granules, and Alcock describes the adambulacral plates as having actinally 3 unequal, longitudinal series of close prismatic granules. Presumably there are no enlarged subambulacral spines. This species was described as a *Mediaster*. Kœhler states that it is a *Pseudarchaster*. From the description it would appear to bear considerable resemblance to the new *Aphroditaster* herein described. It is certainly very different from *Ps. oligoporus*, which has armed inferomarginals and prominent subambulacral spines.

APHRODITASTER MICROCERAMUS, new species.

R = 46 mm., r = 13.5 mm., R = 3.4 r; breadth of ray at mid-interbrachium, 15 mm. Disk fairly large, with open, rounded interbrachia; rays slender and pointed; all plates covered with a close tessellation of flat-topped or slightly convex polygonal granules; no spines except on adambulacral and mouth plates; abactinal area narrower on rays than width of broad, arched superomarginals; abactinal plates compactly placed with usually 6 to 8, but sometimes as many as 12 polygonal crowded granules, or on outer part of ray, 3 or 4; marginals much broader than long, forming a smooth, evenly rounded margin to ray; actinal intermediate plates restricted to disk, and evenly granular; furrow margin slightly convex proximally, decidedly convex distally with 7 to 9 short, stubby spinelets, and 12 to 14 compact, polygonal subambulacral granules in 3 or 4 longitudinal series; no specialized subambulacral spines; no pedicellariæ; adambulacral armature resembling that of *Ceramaster*.

Type.—Cat. No. 30535, U.S.N.M.

Type-locality.—Station 5648, Buton Strait, Celebes (lat. 5° 35′ S.; long. 122° 20′ E.), 559 fathoms, green mud; bottom temperature, 39.2°; 1 specimen.

This species differs from *Aphroditaster gracilis* Sladen (Azores, 1,000 fathoms) in having larger, fewer, and more compact abactinal granules, polygonal in form; shorter marginal plates, armed with flattish, polygonal, compact granules (spinelets on inferomarginals of *gracilis*); compact, polygonal actinal intermediate and subambulacral granules, rather than spinelets; and in lacking the post-adambulacral fascioles.

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plates. It differs in having a straight or only slightly curved furrow margin to the adambulacral plates, an even comb of furrow spines, and no specialized or enlarged subambulacral spine or spines. The two genera are closely related.

Genus PARAGONASTER Sladen.

KEY TO THE SPECIES AND SUBSPECIES OF PARAGONASTER HEREIN DESCRIBED.

a^1. Proximal plates of the single series which separates the superomarginals wider than long, and conspicuously wider than the adjacent radial plates of disk; peripheral granules of the plates of papular area smaller than the central granules; the two sorts subequal elsewhere; central granules slightly spaced, not compact; numerous inferomarginal and actinal intermediate spines; fasciolate pedicellariæ between nearly all the adambulacral plates.....*ctenipes hypacanthus*.

a^2. Proximal plates of the radial series of ray narrower than long and narrower than the adjacent radial plates of disk; peripheral granules of all the abactinal plates smaller than the central, which are very compactly placed; very few inferomarginal and no actinal intermediate spines; incipient fasciolate pedicellariæ between the first few adambulacral plates only, rudimentary distally .....*stenostichus*.

PARAGONASTER CTENIPES HYPACANTHUS, new subspecies.

Closely resembling *P. ctenipes* Sladen, but differing in having more numerous granules on the abactinal plates, more numerous and conspicuous inferomarginal spinules and smaller and more distantly spaced inferomarginal granules, a prominent central spine on many of the actinal intermediate plates, and proximally 2 enlarged subambulacral spines. R = 88 mm., r = 19 mm., R = 4.6 r; breadth of ray at mid-interbrachium, 22 mm.; at inner limit of the single row of abactinal plates (distal margin of fourth superomarginal plate) 12.5 mm., or length of first 6.3 superomarginals measured on ambitus (varies to 5); general form as in *ctenipes*, but rays a little slenderer; abactinal plates with 15 to 25 central and 25 to 30 peripheral granules, which are slenderer on the papular areas; distal carinal plates of disk with upward of 40 central and 35 to 45 peripheral granules; inferomarginal plates with proximally 6 to 10 appressed sharp spinules, reduced to 3 or 4 at middle of ray, then 2, a single spinule persisting to near end of ray; furrow spines 7 or 8, continued along the transverse margins as smaller interlocking spinelets; subambulacral spines prominent, slender, tapering, sharp, proximally 2, distally 1; in small specimens 1 throughout.

Type.—Cat. No. 30536, U.S.N.M.

Type-locality.—Station 5273, off western Luzon, 27 miles southwest Corregidor Light, 114 fathoms, mud, shells, and coral sand.

PARAGONASTER STENOSTICHUS, new species.

Differing from *P. ctenipes* in having the abactinal plates of slender portion of ray narrower than long, and proximally narrower than the adjacent radial plates of disk, instead of broader; in having more

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which lack the characteristic fasciolate pedicellariæ of *ctenipes*, except in a less specialized form on the first few plates. R = 45 mm., r = 12.5 mm., R = 3.6 r; breadth of ray at mid-interbrachium, 14 mm.; at distal margin of fourth superomarginal (the proximal end of the slender portion of ray) 8 mm., or length of first 5½ superomarginals measured on ambitus. Abactinal plates strongly tabulate with convex, subhexagonal or roundish crowns, having in the radial series 18 to 25 close-set, coarse, irregularly polygonal, central granules and 20 to 25 smaller, slenderer, peripheral ones; plates of the single (radial) series which separate superomarginals of ray, slightly tabulate proximally, longer than wide throughout, with granules similar to those of the plates of disk, and all narrower than the radials of disk; superomarginals broad, all wider than long, slightly tumid, with close-set, coarse, polygonal granules; inferomarginals with subsquamiform granules ventrally and 2 or 3 short appressed lanceolate spinules in a group or transverse series on inner half of the proximal plates; adambulacrals only a trifle wider than long, with angular furrow margin, and 7 or 8 furrow spines in a palmate series; first 4 plates with aboral facet of margin much the longer; subambulacral spinelets 12 to 15 with 1 enlarged, tapering, sharp spine; oral spines 8 or 9, on angular margin of mouth plates, those at apex of angle the shortest.

Type.—Cat. No. 30537, U.S.N.M.

Type-locality.—Station 5289, Verde Island Passage, north coast of Mindoro, 172 fathoms, broken shells, sand.

PERISSOGONASTER, new genus.

Differing from *Paragonaster* in having an odd interradial marginal in both series, and an incomplete odd interradial series of actinal intermediate plates; papulæ distributed all over disk and as far along radii as the adradial plates extend.

Type of the genus.—Perissogonaster insignis, new species.

PERISSOGONASTER INSIGNIS, new species.

Similar in general appearance to a *Paragonaster* with unusually large disk, stout rays, and the adradial plates extending in large specimens a third to two-fifths length of ray. R = 113 mm., r = 35 mm., R = 3.2 r; breadth of ray at mid-interbrachium, 40 mm., thence tapering gradually to the bluntly pointed extremity; interbrachia wide and arcuate; superomarginals 37 to 42, broader than long, and increasing slightly in width up to the tenth or twelfth, and beyond the eighth to seventeenth separated only by the rectangular carinal plates; odd interradial plate similar to the rest; plates covered with depressed, roundish, convex, slightly spaced granules, the outer end

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being armed with an inconspicuous, short, appressed, slender, sharp spine extending nearly to end of ray; inferomarginals narrower on outer two-thirds of ray than superomarginals and covered with conical granules; in addition to these, proximally 6 to 10 and distally 2 to 4 slender, sharp, appressed spines, either scattered or in 1 or 2 transverse series; abactinal plates paxilliform, with compact subhexagonal crowns, very regularly arranged in series parallel to the radial; an average radial plate with 9 to 12 roundish or slightly polygonal, spaced, central granules and 20 to 25 flattened, truncate, oblong, or slightly tapered, smaller peripheral ones, these numbers increasing on the distal carinal plates and decreasing on the dorsolaterals; papulæ distributed all over dorsal surface as far distad as there are more than 1 series of abactinal plates; actinal intermediate plates, each with an appressed, sharp, spine; adambulacral plates with an angular but not very salient furrow margin bearing 6 or 7 short, blunt spines; subambulacral spines 1 or 2, sharp, appressed, surrounded by 5 to 8 elongate, subconical granules, in addition to 3 or 4 on outer margin, and 3 to 6 on each transverse margin, the latter often forming a fasciolate pedicellaria over the suture.

Type.—Cat. No. 30538, U.S.N.M.

Type-locality.—Station 5113, Balayan Bay, Southern Luzon, 159 fathoms, on a bottom of dark green mud.

This curious genus bears about the same relation to *Paragonaster* that *Prionaster* bears to *Goniopecten* or *Pectinidiscus* to *Ctenodiscus*. In all the characters except those mentioned in the diagnosis it is essentially similar to *Paragonaster*.

Genus ROSASTER Perrier.

Rosaster PERRIER, Expéd. sci. du *Travailleur* et du *Talisman*, 1894, p. 386.—Type, *Pentagonaster alexandri* Perrier.

Nereidaster VERRILL, Trans. Conn. Acad., vol. 10, 1899, p. 186.—Type, *Nymphaster symbolicus* Sladen.

I have for some time suspected that *Rosaster alexandri* Perrier might be closely allied to the section of *Nymphaster* called *Nereidaster* by Verrill in 1899 (type, *Nymphaster symbolicus* Sladen). In 1906 I raised *Nereidaster* to generic rank, including in it a species, *Nereidaster bowersi*, which proves not to be congeneric with the type of *Nereidaster*. It is this misconception of *Nereidaster* which I incorporated in a key to the genera of Goniasteridæ in the Asteroidea of the North Pacific, page 170.

I made a cursory examination of *Rosaster alexandri* several years ago and thought I found rudimentary superambulacral plates. These are not present. What I saw, on closer examination, proves to be curious spiny outgrowths from the lower end of the small ambulacral ossicles. The arrangement of the gonads in this species as well as

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the presence of internal abactinal ossicles, similar to those of "*Nymphaster*" *symbolicus* (and of the species herein described), leaves no doubt that *Nereidaster* and *Rosaster* are the same. *Rosaster symbolicus* (Sladen) is represented in the collection by 2 adult specimens.

A further discussion of the anatomy and relationships will have to be deferred until the final report. Meanwhile the following diagnosis of *Rosaster*, drawn up with reference to the seven known species, may be useful.

Goniasteridæ resembling *Mediaster* in having internal supplementary ossicles connecting the abactinal plates and in having the gonads arranged in series extending along the rays, but differing in lacking rudimentary superambulacral ossicles, and in having the superomarginals in contact medially over a considerable portion of the ray (if separated, then only by a single series of small plates for a considerable distance); pedicellariæ always slender, tong-shaped, not of the low-bivalved form. Resembling *Nymphaster* in form but differing in the serial arrangement of gonads, in having strongly tabulate subpaxilliform abactinal plates, and in lacking the strongly angular furrow margin to the adambulacral plates. Form stellate, with well-developed rays; superomarginals in contact distally, sometimes for a considerable portion of ray; abactinal plates strongly tabulate on papular areas and with internal radiating connecting ossicles; actinal interradial areas large; adambulacral plates with a straight or slightly curved furrow margin bearing a regular comb of few to many, usually compressed, spines, and spaced from these a subambulacral series of spines, more or less prismatic, the outer part of the plate being occupied by granules sometimes graduated in size toward the subambulacral series of spines; pedicellariæ rather slender, spatulate, and intrenched; no superambulacral ossicles; gonads in several independent tufts which extend in a series along the ray, close to, or removed from, the margin and usually parallel to the radius; tube feet without deposits.

KEY TO THE KNOWN SPECIES OF ROSASTER.

a^1. Superomarginals contiguous for nearly half to more than half of R; not separated by a single series of small plates for a considerable distance.

b^1. Furrow spines 4 or 5, at least few in number; size small.

c^1. Abactinal paxilliform plates roundish, with subequal, thorny spinelets; granules of marginal plates longer than diameter, thorny and resembling very short spinelets; furrow spines relatively long, slender, compressed. ..... *alexandri*.

c^2. Abactinal plates hexagonal, with unequal granules, the peripheral on the lateral edges of the radial and adradial plates being enlarged and opercular,

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c^1. Size small; radial tabulate plates roundish, a few distal abactinal plates isolated singly between consecutive pairs of contiguous superomarginals; furrow spines 7 or 8; subambulacral spines and granules in 3 series....*confinis*.[1]

c^2. Size medium or large; radial tabulate plates hexagonal.

d^1. Furrow spines 14 or 15; large radial plates with 12 to 23 central granules. ..... *mimicus*.

d^2. Furrow spines 8 to 10; large radial plates with 2 to 4 central granules. .....*bipunctus*.

a^2. Superomarginals separated on outer part of ray by a single series of abactinal plates, but the last few plates may be in contact medially.

b^1. Size small; distal marginals with a small central tubercle; marginals tumid; furrow spines 4 or 5 .....*mamillatus*.

b^2. Size large; distal marginals not tuberculate; marginals not individually tumid; furrow spines 8 to 12.....*symbolicus*.

ROSASTER NANNUS, new species.

A small species resembling *R. confinis* (Kœhler), but differing in having larger, hexagonal, radial plates, with differently formed and characteristic marginal granules, fewer furrow spines (4 or 5) and 2 instead of 3 series of subambulacral spines and granules. Disk stellato-pentagonal, the rays at first tapering abruptly to the third superomarginal, which meets its fellow medially, then very gradually, the extremity being blunt and the general form resembling that of *Paragonaster;* breadth of ray at inner end of third superomarginal equaling first 2½ superomarginals measured on ambitus; radial plates large, with large, valve-like granules on the lateral borders, and smaller ones on the transverse margins; furrow spines 4 or 5; subambulacral armature in 2 longitudinal series, the inner consisting of 3 or 4 spines; consecutive plates of median radial series joined by 2 internal ossicles, and joined to the adradials by 2 transverse ossicles, the former being absent on the adradial series. R = 24 mm., r = 6.5 mm., R = 3.7 r; breadth of ray at mid-interbrachium, 7 mm.

Type.—Cat. No. 30539, U.S.N.M.

Type-locality.—Station 5152, Tawi Tawi Group, Sulu Archipelago (lat. 5° 22′ 55″ N.; long. 120° 15′ 45″ E.), 34 fathoms, white sand.

Dorigona confinis Kœhler has been included in this genus only on the evidence of external characters. It appears to be related to *R. nannus.*

Although the specimens are small the gonads are relatively very large, and fill up most of the cœlom of the base of the ray. They consist of thick unbranched or bifid sacs in clusters of 1 to 5, these extending in a series close to the margin as far as the third superomarginals, or until the latter join medially. There seem to be at least 5 of these clusters in each series.

The rays are formed for the greater part of their length, above, by the superomarginals, which are all longer than wide, as seen from the

[1] *Dorigona confinis* Kœhler, An account of the shallow-water Asteroidea. Echinoderma of the Indian Museum, part 6, Asteroidea (II), June, 1910, p. 57.

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dorsal side, and rather evenly and fully curved from the inner to the outer margin, the lateral face being only a trifle narrower than the dorsal. Plates 13 in type, increasing in size up to the third which meets its fellow medially. This plate is slightly longer than wide (or the 2 dimensions subequal) as seen from above, and thence the plates are increasingly longer than wide. The first 3 plates are shorter than the chord of the extreme width, however, and in the fourth the length about equals chord of width. The plates are covered with slightly spaced, depressed, subspherical granules, subequal to those occupying the center of the abactinal plates. Beyond the second inferomarginal all are normally longer than wide, as seen from below. A small entrenched 2-jawed pedicellaria is found on some of the proximal plates of the type, but not in other specimens.

ROSASTER MIMICUS, new species.

Resembling somewhat *R. bipunctus* (Sladen), but differing in having sharper rays, compacter paxillæ with numerous crowded central granules, more numerous, compressed, furrow spines (12 to 14), more numerous subambulacral spines and granules, and more numerous oral spines. Form stellate with arcuate interbrachia and gradually tapering rays; sides of ray and disk perpendicular with a longitudinal depression; breadth of ray, measured at proximal suture of first pair of superomarginals which meet medially equal to first 3½ or 4 superomarginals measured on ambitus; abactinal plates strongly tabulate on papular areas and with upward of 23 central and 25 peripheral granules on the radial series; abactinal, marginal, actinal intermediate, and adambulacral pedicellariæ; subambulacral armature a series of prismatic spines and 2 or 3 parallel series of granules; furrow spines 12 to 14. R = 56 mm., r = 21 mm., R = 2.7 r (cotype); in type R = probably 75 mm. and r = 23 mm.

Type.—Cat. No. 30540, U.S.N.M.

Type-locality.—Station 5281, between Lubang and Luzon (lat. 13° 52′ 45″ N.; long. 120° 25′ E.), 201 fathoms, dark gray sand; bottom temperature, 50.4° F.

ROSASTER MAMILLATUS, new species.

Differing from *R. alexandri*, and other small species, in having the superomarginals beyond the third plate separated by a single series of abactinal plates nearly to extremity of ray, and in the presence on

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inferomarginals corresponding to superomarginals, tumid, the last 6 or 7 with a subcentral enlarged granule. Area of abactinal plates stellate; median radial plates wider than long, subhexagonal, the others subcircular, all tabulate; granules relatively coarse, the peripheral flattened, finger-nail-shaped, 10 to 12 on the radial plates and 8 to 10 on laterals; central granules roundish, low, 2 or 3 to 6 on radial plates, 1 to 3 on lateral plates; carinal plates of attenuate part of ray small, those opposite the transverse sutures of superomarginals elliptical or lozenge-shaped, the alternate plates smaller and oblong; abactinal plates with a few upright conspicuous pedicellariæ, with 2 oblong or slightly tapered jaws. Adambulacral plates with a slightly curved furrow margin and 4 or 5 subequal, slightly compressed, blunt, furrow spines; subambulacral spines 3 or 4 in an oblique longitudinal series spaced from furrow, followed by proximally 3 or 4 granules in a single series, or distally 5 or 6, usually in 2 series. Oral spines 8, similar to the adambulacral furrow spines.

Type.—Cat. No. 30541, U.S.N.M.

Type-locality.—Station 5481, Surigao Strait, off Cabugan Grande Island, Leyte, 61 fathoms, sand, shells, gravel.

This species agrees with *R. symbolicus* in having the superomarginals of the ray, with the exception of the last 2 or 3, separated by a single series of abactinal plates, but differs in having conspicuously tumid marginal plates, the distal half dozen of each series bearing a small central tubercle. The furrow spines are 4 or 5 instead of 8 to 12, and the species is small, while *symbolicus* is large.

Genus NYMPHASTER Sladen.

KEY TO THE SPECIES OF NYMPHASTER HEREIN DESCRIBED.

a^1. Marginal mouth spines (bordering on mouth of ambulacral furrow) 6 or 7, exceptionally 8 (if 8, then rays not conspicuously slender, but if measured at proximal suture of the first pair of superomarginals which meet medially, equaling length of first 3½ to 4½ superomarginals measured on ambitus); some of the radial plates wider than long; mouth plates small, and rays stout, the inferomarginals extending laterally beyond superomarginals.

b^1. Mouth plates nearly or quite inclosed by the first pair of adambulacrals; numerous subambulacral spines; abactinal granules mucronate ..... *mucronatus.*

b^2. Mouth plates not inclosed; subambulacral spines few or none (granules only); abactinal granules at best only incipiently mucronate, and these few in number.

c^1. Five longitudinal series of abactinal radial plates with the distal as well as proximal plates obviously wider than long; no marginal or abactinal pedicellariæ; inferomarginals and superomarginals wider, the latter on rays, the former on disk; width of ray as measured in a^1, equaling first 4 or 5 superomarginals ..... *euryplax.*

c^2. Radial plates not so obviously wider than long, the difference showing on the proximal plates of the radial areas rather than on the distal; numerous abactinal and a few marginal pedicellariæ; superomarginals narrower on ray and inferomarginals narrower on disk; ray measured as in a^1 equaling first 3½ superomarginals ..... *dyscritus.*

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b^1. Abactinal radial plates conspicuously wider than long (much as in *mucronatus*); rays very slender.....*leptodomus*.

b^2. Abactinal radial plates roundish or hexagonal, not conspicuously broader than long.

c^1. Second superomarginals meeting in median line across ray (4 superomarginals in each interbrachium); inferomarginals of ray very narrow and long, the length at middle of ray exceeding the height (or thickness) of lateral face of ray; rays slender and delicate; oral spines, 10 or 9.....*atopus*.

c^2. Fourth, fifth, and sixth superomarginals meeting in median line across ray (sometimes third in young specimens), and therefore 6 to 12 superomarginals to each interbrachium); length of inferomarginals at middle of ray equal to or less than height of lateral face of ray.

d^1. Ray broader at base, measured as in a^1 equaling first 4½ superomarginals; superomarginals very broad, not tumid; oral spines, 10 to 12; furrow spines 10; inferomarginal plates of interbrachia extending laterally beyond superomarginals.....*moluccanus*.

d^2. Ray narrow at base, measured as in a^1 equaling first 3 to 4 superomarginals; if approaching d^1, then superomarginals tumid; in interbrachia superomarginal plates extending laterally beyond inferomarginals.

e^1. Marginal plates individually tumid; no adambulacral pedicellariæ; mouth spines 9 or 10; furrow spines 9 to 11 at middle of ray....*arthrocnemis*.

e^2. Marginal plates not individually tumid; adambulacral pedicellariæ; furrow spines at middle of ray more than 11.

f^1. Dorsolateral angle of ray about 90°, square cut; dorsal surface plane; marginal granulation closer; sixth and sometimes fifth superomarginal longer than width of its dorsal surface; 10 inferomarginals corresponding to about 16 adambulacrals; mouth spines 9 to 11.....*meseres*.

f^2. Dorsolateral angle of ray more rounded, the dorsal surface being convex; marginal granules more spaced; ninth or tenth superomarginal longer than width of its dorsal surface; 10 inferomarginals corresponding to 13 or 14 adambulacrals; mouth spines 12 to 15.....*habrotatus*.

NYMPHASTER EURYPLAX, new species.

General form similar to that of *N. diomedeæ* Ludwig and *N. ternalis* (Perrier), but superomarginals with plane abactinal surface, not tumid; rays broad at base and actinal surface conspicuously wider than abactinal, the edges between the 4 faces of the ray being abruptly angular; disk arcuately pentagonal, gradually merging into rays at corners; extreme width of ray, measured at proximal suture of the first pair of superomarginals, which meet medially, equaling length of first 4 or 5 superomarginals, measured on ambitus; inferomarginals broad; rays not sunken along median radial line; inferomarginals broader than superomarginals on disk, but narrower on ray; radial and adradial abactinal plates broader than long, hexagonal, elliptical, and lozenge-shape; adambulacral plates with very strong furrow angle and 9 or 10 furrow spines, the apices of the angles of opposite plates meeting in middle of furrow and segregating consecutive pairs of tube-feet beyond proximal fourth of furrow; mouth plates with 6 to 8 marginal spines; no pedicellariæ except rarely on the first

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few adambulacral plates. R = slightly over 95 mm. (ray broken), r = 27 mm., R = a little over 4 r.

Type.—Cat. No. 30542, U.S.N.M.

Type-locality.—Station 5516, Mindanao Sea, off Point Tagolo, Mindanao, 175 fathoms, globigerina; bottom temperature, 54.3° F.

A large radial plate has 5 to 12 central, subspherical uncrowded granules and upward of 20 squarish, depressed, peripheral granules, a trifle smaller. On the lateral parts of the papular areas the central granules become more convex or elevated, with a short, incipient, mucronate tip; interradially the granules are flat-topped. The petaloid papular areas are broad, the extreme width comprising about 10 to 12 longitudinal series of plates. The first 2 or 3 adambulacral plates with 5 or 6 furrow spines, blunt, nearly equal, slightly compressed; then the plates gradually attain first a convex, then a strongly angular margin, and the furrow spines increase to 9 (less often 10), the 3 to 5 mesial nearest apex of angle being more slightly built, compressed, with edge to furrow, the 2 or 3 at either end of the series being stouter, sublanceolate, blunt, with flat side to furrow. Subambulacral granules 8 to 16, in 2 or 3 series on outer part of ray, but not so regularly arranged, as a rule, proximally. The outer granules are subconical or acorn-shaped, but a series of 2, 3, or even more back of the furrow spines are longer, slightly flattened, and rather tubercular in form.

N. euryplax closely resembles *N. belli* (Kœhler), from 250 fathoms, off the Andaman Islands. It agrees in having the radial and adradial abactinal plates much broader than long, in having the ray broad at the base, with the fifth superomarginals conspicuously enlarged and in contact medially, and in the general absence of abactinal pedicellariæ, but differs in having the inferomarginals extending laterally beyond the superomarginals, so that the actinal surface is wider than the abactinal; in having longer, stouter rays; the 2 or 3 series of abactinal plates parallel to the adradial are not so wide in proportion to length—are nearly round, and have more numerous granules; the madreporic body is surrounded by 6 plates, not 4; the first row of suboral granules is enlarged into spines; the furrow spines are 9 or 10 at middle of ray (Kœhler gives 7 or 8 for *belli*, but possibly he referred only to the proximal plates where in *N. euryplax* there are at first 5 or 6, then 7 or 8, and finally a maximum of 9 or 10).

NYMPHASTER DYSCRITUS, new species.

Differing from *N. euryplax* in having less obviously widened abactinal radial plates, slightly narrower superomarginals, the sixth being as long as or longer than wide (eighth to sixteenth in *euryplax*) when viewed directly from above; numerous abactinal pedicellariæ, a few superomarginal, inferomarginal, and actinal intermediate pedicel-

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pair of superomarginals which meet medially as wide as length of first 3½ superomarginals measured on ambitus; interbrachia arcuate; dorsal surface of ray nearly plane, with abrupt angles on the margin of disk and ray. R = probably nearly 4 r; r = 23 mm.; breadth of ray at mid-interbrachium, 26 mm.

Type.—Cat. No. 30543, U.S.N.M.

Type-locality.—Station 5526, between Negros and Siquijor Islands, Philippine Islands, 279 fathoms, green mud; bottom temperature, 52.3° F.

This species resembles in general appearance *N. moluccanus*, and *N. ternalis* of Kœhler (but not Perrier) from the Indian region. Very likely the latter is a race of *dyscritus*. Kœhler's species has more regularly hexagonal abactinal plates, 8 adambulacral furrow spines (maximum?), more numerous adambulacral pedicellariæ (a variable character), 8 or 9 mouth spines, and the apophysis commences between the third or fourth and fifteenth adambulacral plates, varying on different specimens.

N. dyscritus has the apophysis appearing on the first plate, but not becoming conspicuous for 5 or 6 more plates. The first plate has 5 or 6 furrow spines which increase to 10, the laterals being broader than the 2 or 3 mesial spines, which are compressed to an even thickness, but are slightly tapering and round-tipped when seen from the side, as indeed are the laterals. Subambulacral granules 10 to 14, in about 3 series, the inner slightly longer than the outer. The first few plates have a pedicellaria with 2 or 3 coarse, tapering, slightly curved, bluntly pointed, spiniform jaws.

N. dyscritus differs from the true *N. ternalis* (Perrier) in having less tumid marginal plates, smaller abactinal radial plates, a sharper, more abrupt angle to margin of ray, longer superomarginals in proportion to their width (on ray) and in having the marginal apophysis on all the adambulacral plates.

NYMPHASTER MUCRONATUS, new species.

Very similar to *N. euryplax* in general form and in having the radial plates wider than long, but differing in having much less compact radial plates with fewer and mucronate granules; larger madreporic body; narrower inferomarginals; coarser, and more tuberculate, sometimes mucronate, unequal, actinal intermediate granules; smaller mouth plates, with the first adambulacrals nearly or quite meeting behind them; many of the subambulacral spines of conspicuous size, and graduated into the tubercular granules of the actinal intermediate plates. Rays broad at base, the width at inner end of the first 2 superomarginals which meet medially equaling first 4 superomarginals measured on ambitus; interbrachia arcu-

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ate; inferomarginals defining contour of ray; dorsal surface of ray nearly plane; normal marginal plates not tumid, though inferomarginals with slightly arched ventral surface; adambulacral furrow spines 4 or 5 on first few plates, these gradually increasing to 9 or 10; oral spines 6 or 7. R = 101 mm., r = 30 mm., R = 3.4 r; breadth of ray at mid-interbrachium, 34 mm.

Type.—Cat. No. 30544, U.S.N.M.

Type-locality.—Station 5116, mouth of Balayan Bay, Luzon (off Verde Island Passage, north coast of Mindoro), 200 fathoms; bottom temperature, 50.2° F.

N. mucronatus differs from *N. belli*, to which the form of the radial plates would ally it, in having mucronate granules, larger madreporic body surrounded by 6 plates, inferomarginals extending laterally beyond superomarginals, larger, unequal acorn-shaped, often incipiently mucronate, actinal intermediate granules, smaller mouth plates, and numerous, stout subambulacral spines.

NYMPHASTER LEPTODOMUS, new species.

In the form of the abactinal plates resembling *N. mucronatus*, but differing in having longer, slenderer rays, narrower superomarginals, inferomarginals extending little or not at all beyond superomarginals, subspherical, depressed, sometimes truncate abactinal granules, abactinal, spatulate pedicellariæ, larger mouth plates, 8 to 10 oral spines, adambulacral pedicellariæ, and no conspicuously enlarged subambulacral spines. Rays very slender, varying from plane to convex above, the width at inner end of the first pair of superomarginals which meet medially equal to length of first 3 superomarginals measured along side; adambulacral furrow spines proximally 6, distally 10 or 11. R = 70 mm., r = 17.5 mm., R = 4 r, breadth of ray at mid-interbrachium, 20 mm.

Type.—Cat. No. 30545, U.S.N.M.

Type-locality.—Station 5216, between Burias and Luzon, 215 fathoms, green mud; bottom temperature, 51.9° F.

NYMPHASTER MOLUCCANUS, new species.

Similar in general form to *N. euryplax*, but radial paxillæ smaller, hexagonal, and not conspicuously widened; petaloid papular areas narrower and oral spines 10 to 12; marginal plates rather broad; ray broad at base, the width at inner end of the first pair of superomarginals which meet medially equaling length of first 4½ superomarginals measured on ambitus; adambulacral plates with strong furrow angle; minimum number of furrow spines at base of ray 8 or 7; maximum number 10 (rarely 11). R = 86 mm., r = 21.5 mm.; breadth of ray at mid-interbrachium, 26 mm.

Type.—Cat. No. 30546, U.S.N.M.

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Type-locality.—Station 5622, between Gillolo and Makyan Islands, Molucca Islands, 275 fathoms, gray mud.

The petaloid papular areas are narrower than in *euryplax*, comprising 7 to 9 longitudinal series of plates. Proximal median radial plates with 8 to 10 circular, depressed, central granules (in 3 transverse series) and 15 or 16 slightly smaller, peripheral ones. Superomarginal plates broad, very faintly convex, and with an abrupt rounded angle at ambitus. They form a slightly raised border to disk, and one which is a trifle on a bevel; fifth superomarginals the largest, meeting medially. Superomarginal granules depressed, hemispherical, slightly larger than on neighboring abactinal plates, slightly spaced, with a regular beadlike marginal series. The apophysis or furrow angle of adambulacral plates begins on fourth or fifth plate and rapidly increases in prominence, the adoral facet of the apophysis being about two-thirds the length of the aboral, which is slightly hollowed out. The subambulacral granules are 15 to 25 in 3, sometimes 4, irregular rows; outer granules hemispherical, becoming somewhat four-sided or prismatic toward the furrow, and on the disk the innermost series is enlarged into short tubercular subprismatic spines, which decrease in length as the base of ray is approached. On the disk a few plates have a small pedicellaria, with 3 slender curved jaws, in the inner series of subambulacral spines, opposite the furrow angle.

This species differs from *N. ludwigi* (Kœhler) in having broader rays at the base, which taper more abruptly; more numerous marginals in each interbrachium; wider adambulacrals with 3 or 4 rows of granules instead of 2; a much more prominent apophysis proximally on the adambulacral plates; a few adambulacral and actinal intermediate but no marginal nor abactinal pedicellariæ; madreporic body surrounded by 5 or 6 plates instead of 4.

NYMPHASTER ARTHROCNEMIS, new species.

In the form of the marginal plates resembling *N. ternalis* (Perrier) but with smaller disk, longer rays, smaller radial abactinal plates, smaller papular areas; furrow angle of adambulacrals beginning with the third or fourth instead of the twenty-fourth plate; no adambulacral and marginal pedicellariæ. Marginal plates tumid, the median line of ray depressed below the lateral angle of superomarginals; ray rather slender from the base. the width at inner end of first pair

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mm., r = 21 mm., R = over 4 r (small portion of tip of ray broken); breadth of ray at mid-interbrachium, 24 mm.

Type.—Cat. No. 30547, U.S.N.M.

Type-locality.—Station 5648, Buton Strait, Celebes (lat. 5° 35′ S.; long. 122° 20′ E), 559 fathoms; bottom temperature, 39.2° F.

NYMPHASTER MESERES, new species.

Similar in proportions and general form to *N. arthrocnemis* but marginal plates not tumid (although ray is sharply four-angled) and dorsal surface is subplane; sixth and sometimes fifth superomarginal longer than width of dorsal surface (tenth in *arthrocnemis*); third inferomarginal longer than width of its actinal surface; superomarginal and inferomarginal two-jawed slender pedicellariæ regularly present. Width of ray at proximal end of first pair of superomarginals which meet medially equaling first 3½ to 3⅔ superomarginals, measured along ambitus; radial abactinal plates hexagonal to roundish; oral spines 9 to 11; furrow spines increasing from 5 or 6 to 10, 11, and 12 far along ray. R = about 60 mm., r = 17 mm., R = 3.6 r ±; breadth of ray at mid-interbrachium, 19 mm.

Type.—Cat. No. 30548, U.S.N.M.

Type-locality.—Station 5115, off northern Mindoro (Verde Island Passage), 340 fathoms.

This species is most likely to be confused with *N. arthrocnemis* and *N. habrotatus*. It differs from the latter in having square-angled rays, with a plane dorsal surface, a closer marginal granulation, the sixth and sometimes the fifth superomarginal longer than width of its dorsal surface (ninth or tenth in *habrotatus*); 10 inferomarginals corresponding to about 16 adambulacrals (13 or 14 in *habrotatus*); coarser actinal interradial granulation; fewer mouth spines (12 to 15 in *habrotatus*); primary apical plates smaller—not conspicuous, whereas they are in *habrotatus*.

NYMPHASTER HABROTATUS, new species.

Rays long and slender as in *N. arthrocnemis*, but not tumid, the dorsal surface of ray evenly arched proximally, and oral spines 12 to 15; contour of ray as seen from below, even, not constricted at intervals; breadth of ray at inner end of the first pair of superomarginals which meet medially equal to first 3 to 3½ superomarginals measured on ambitus; superomarginals, as seen from above wider than long up to the sixth or seventh; the next 2 or 3 squarish; granules round and well spaced; a few marginal two-jawed pedicellariæ; median radial plates slightly wider than long, all slightly elevated; primary apical plates conspicuous; adambulacral plates with proximally 7 or 8 and farther along ray upward of 14 furrow spines; apophysis beginning on second or third plate, but becoming prominent gradually; adambulacral two- to four- jawed pedicel-

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lariæ; third inferomarginal longer than wide as seen from below. R=76.5 mm., r=17 mm., R=4.5 r; breadth of ray at mid-interbrachium, 19 mm.

Type.—Cat. No. 30549, U.S.N.M.

Type-locality.—Station 5491, between Leyte and Mindanao, 736 fathoms, green mud, coral; bottom temperature, 52.3° F.

NYMPHASTER ATOPUS, new species.

Differing from other species herein described in having only 4 interbrachial superomarginals; rays slender, the width at outer end of second superomarginals (which corresponds in position to the inner end of the first pair of plates which meet medially, in other species) equaling length of first 3 superomarginals measured on ambitus; superomarginals longer than wide; inferomarginals on ray very slender, resembling terete rods placed end to end; marginal granulation relatively coarse, spaced; abactinal plates small, roundish hexagonal, with few granules; oral spines 9 or 10; adambulacral furrow spines proximally 7 or 8, then 10 or 11; apophysis is prominent from the third plate on; distal plates much longer than wide, with 1 series of granules and a few extra in the angle of the apophysis; about 15 or 16 adambulacrals corresponding to 10 inferomarginals of ray. Cotype, R=43+mm., r=9 mm., R=at least 5 r (tip of ray broken).

Type.—Cat. No. 30550, U.S.N.M.

Type-locality.—Station 5428, Sulu Sea, off Palawan (lat. 9° 13′ N.; long. 118° 51′ 15″ E.), 1,105 fathoms, gray mud; bottom temperature, 49.7° F.

CERAMASTER SMITHI, new species.

In general appearance closely resembling *C. clarki* Fisher but differing in having less elevated abactinal plates, with shorter and differently formed basal lobes; more numerous granules, especially on center of tabulum; smaller pedicellariæ; coarser and characteristically formed subambulacral spines. General form arcuately pentagonal, produced at the corners into short blunt rays; body thin; margins thin, the plates being small as in *C. clarki;* abactinal plates very short lobed and with hexagonal crowns on papular areas, composed of 10 to 18 central and 15 to 22 peripheral, subequal, slightly spaced granules, and often a small, spatulate, 2-jawed pedicellaria; superomarginals

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Type-locality.—Station 5201, Sogod Bay, southern Leyte Island, 554 fathoms, gray sand, mud; bottom temperature, 52.8°.

This species is named in honor of Dr. Hugh M. Smith, Deputy Commissioner of Fisheries, in charge of the Philippine explorations.

PELTASTER CYCLOPLAX, new species.

Differing from *P. nidarosiensis* (Storm) in having entrenched, 2-jawed pincer-shaped or "sugar-tongs" pedicellariæ instead of the sessile, bivalved type; in having very many more granules on the abactinal plates, more tumid and longer proximal superomarginal plates, and very numerous actinal intermediate pedicellariæ; rays longer. General form stellate, with short rays and shallow, arcuate, interbrachia; R = 109 mm., r = 51 mm., R = 2.1 r; breadth of ray at mid-interbrachium, 60 mm. Abactinal plates finely granulated, the larger primary plates with 35 or 40 peripheral, and 120 central, slightly smaller granules; proximal radial plates surrounded, partially or wholly, by smaller, secondary, plates; very numerous small abactinal, broadly spoon-shaped, denticulate pedicellariæ; superomarginals proximally very tumid, 15 or 16 to the ray, closely granulate except for a central irregular, bare space on many plates; a few superomarginal and inferomarginal pedicellariæ; actinal intermediate areas very large, closely granulate, nearly all the plates with 1 or sometimes 2 forceps pedicellariæ, so that in the aggregate they appear very numerous, the plates being small; adambulacral plates with 5 or 6 stout, blunt, 4-sided or compressed furrow spines, and 2 arcuate series of subambulacral spines (4 or 5 in each series) followed by 12 to 15 granules, in 2 crowded, irregular series.

Type.—Cat. No. 30552, U.S.N.M.

Type-locality.—Station 5279, China Sea, near Malavatuan Island, Southern Luzon, 117 fathoms on a bottom of green mud.

The pedicellariæ of *P. nidarosiensis* are of the bivalve type characteristic of *Hippasteria*, whereas in *cycloplax* they are of the entrenched 2-jawed sugar-tongs type, similar to those of *Nymphaster*, and other related genera. If *P. hebes* Verrill is distinct from *nidarosiensis*, it will differ in practically the same characters as that species. *P. planus* Verrill lacks pedicellariæ entirely, and has fewer abactinal granules to the plate, wider and less tumid superomarginal plates, and only 3 or 4 furrow spines.

SPHÆRIODISCUS SCOTOCRYPTUS, new species.

In general appearance greatly resembling *Ceramaster granularis* (except as regards the enlarged antepenultimate superomarginals). Differing from *S. ammophilus* (Fisher) and *S. bourgeti* (Perrier) in having much narrower superomarginals, more restricted papular areas, much longer adambulacral plates with more numerous furrow spines,

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and larger mouth plates. Form pentagonal, with straight sides, produced at the angles into rays only 2 superomarginals in length. Superomarginals narrow, increasing slightly in size up to the third, the remaining 2 being smaller; surface bare, except for scattered granules, and several rows near margin. Abactinal plates granulate. a comparatively few of the radial and adradial series being low tabulate; plates hexagonal on radial regions, generally 4-sided interradially, and irregularly hexagonal on center of disk. Adambulacral plates longer than wide, or as long as wide, with a straight-edged furrow comb of 9 or 10 flattened, rather narrow, truncate spines, and spaced from these 2 or 3 subambulacral series of granules, the inner the larger. Mouth plates large with 15 to 17 furrow spines. Abactinal, marginal, and actinal intermediate spatulate pedicellariæ with "sugar-tongs" jaws. R=32 mm., r=22 mm., R=1.45 r.

Type.—Cat. No. 30553, U.S.N.M.

Type-locality.—Station 5425, Sulu Sea near Cagayanes Island, 495 fathoms, gray mud, coral sand.

ICONASTER PERIERCTUS, new species.

Differing from *I. longimanus* in having more elevated, and rough superomarginals; all the abactinal plates perfectly smooth and with a complete series of peripheral granules; a less compact adambulacral armature with fewer spines and granules. R=23 mm., r=10 mm., R=2.3 r; breadth of ray at inner end of third superomarginals, 6 mm., or the length of the first 3 superomarginals measured on ambitus. Superomarginals tabulate, separated by conspicuous grooves, the surface having irregular elevations but no granules nor blister-like minute bosses; beyond the second plate they are united on the median line of ray; abactinal area sunken, the plates perfectly smooth with a single peripheral series of granules largest on the radial papular areas; peripheral plates tumid, the others slightly swollen, with a plane surface, but not tabulate; plates of center of disk very conspicuously the largest; inferomarginal plates tumid, the first 3 or 4 perfectly smooth, the remainder with slight roughening; actinal intermediate plates in 3 chevrons, smooth, with a single peripheral series of oblong granules; adambulacral plates small. wider than long with 3 or 4 small, stubby, furrow spinelets and following these. 2 shorter. compressed. flat-sided granules. the outer

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Astroceramus. But the actinal intermediate plates are like those of *Iconaster* and *Lithosoma*, being without central granules. The adambulacral armature is similar to that of *Iconaster* while suggesting *Astroceramus* in the slightly more differentiated inner subambulacral series and in the presence of a conspicuous transversely oriented pedicellaria. To put these facts in a different way: *I. perierctus* differs from *Iconaster* in having the dorsal radial plates entirely surrounded by granules, and in having the tumid superomarginals roughened by uneven elevations (which, unlike those of *Astroceramus*, do not have scattered granules). It differs from *Astroceramus* in lacking any trace of marginal and enlarged central actinal intermediate granules, in having the adambulacral armature graded from the short furrow spines to the outer granules, and in the absence of a conspicuously enlarged subambulacral on the outer part of the ray.

ASTROCERAMUS LIONOTUS, new species.

Similar in appearance to *A. callimorphus* but differing in having less tumid marginal plates, especially on the ray, slightly smaller abactinal plates, and very strongly compressed, bladelike, subtruncate furrow spines; subambulacral pedicellariæ slenderer and longer than the actinal intermediate pedicellariæ, not similar to them. R = 79 mm., r = 22 mm., R = 3.6 r; breadth of ray at inner end of first pair of superomarginals which meet medially equal to length of first 3¾ or 4 superomarginals measured on ambitus; thickness of disk interradially equal to length of 1½ adjacent superomarginals. Abactinal plates flat, smooth, except for minute hyaline bosses, and bordered by small granules flush with the general surface; superomarginal plates massive, increasing in size up to the third or fourth, which meet medially; margin of ray forming an abrupt right angle, with uneven elevations bearing scattered deciduous granules, these encroaching upon surface of plates interradially; a few marginal sugar-tongs pedicellariæ; inferomarginals slightly and unevenly tumid, with upward of 30 deciduous granules; marginals bordered by a moniliform series of small granules; actinal interradial areas very similar to those of *A. callimorphus;* furrow spines 4 or 5, compressed, and widened at tip; subambulacral spines 2 or 3, heavy, with proximally, between them a slender spatulate two-jawed pedicellaria; on outer part of ray, subambulacral spine single and much longer than furrow spines.

Type.—Cat. No. 30555, U.S.N.M.

Type-locality.—Station 5523, 6.7 miles northeast of Point Tagolo, northern Mindanao; depth and bottom not recorded.

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ASTROCERAMUS SPHÆRIOSTICTUS, new species.

Similar in general appearance to *A. lionotus* but differing in having 1 or 2, rarely upward of 5, acorn-shaped, tubercular granules on the middle of the abactinal plates; numerous abactinal, broadly spatulate, or narrowly fan-shaped sugar-tongs pedicellariæ; more numerous marginal granules, scattered over the entire surface of marginal plates; larger and more numerous actinal intermediate pedicellariæ and coarser tubercular granules; more numerous subambulacral pedicellariæ; proximally slenderer furrow spines; commonly only 1 larger subambulacral spine, or if 2, these frequently in a transverse series; slenderer oral spines. R=73 mm., r=22.5 mm., R=3.2+r; breadth of ray at proximal end of third pair of superomarginals (which meet medially) equal to length of first 4½ superomarginals measured on ambitus. Abactinal plates subcircular with a single marginal moniliform series of tiny granules and 1 to several much larger tubercular acorn-shaped granules in center; marginal plates tumid, with uneven elevations bearing numerous deciduous granules in lines and groups; actinal intermediate plates with 3 to 6 prominent acorn-shaped tubercular granules on the surface and a single moniliform series of subconical or subfoliaceous granules on the margin; pedicellariæ numerous, with 2 rather large, narrowly fan-shaped or abruptly spatulate jaws; furrow spines 4 or 5, slender, and only a trifle compressed proximally, distally markedly compressed; subambulacral spines heavy, clavate, proximally larger than in *A. lionotus*, and sometimes furrowed near the tip; subambulacral pedicellariæ numerous, 1 to a plate, the jaws slender, spatulate, and nearly or quite as long as the furrow spines.

Type.—Cat. No. 30556, U.S.N.M.

Type-locality.—Station 5135, 11.9 miles northeast of Jolo Light, Jolo, Sulu Archipelago, 161 fathoms, fine coral sand; bottom temperature, 54.7° F.

CALLIASTER CORYNETES, new species.

Differing from *C. childreni* in having much heavier marginal and actinal spines, and numerous pedicellariæ; from *C. pedicellaris* in having heavy actinal intermediate spines, more numerous and longer furrow spines, and prominent spines in the center of disk; from *C. baccatus* in having longer spines generally, numerous pedicellariæ, more numerous furrow spines, and a few prominent abactinal spines instead of tubercles all over the abactinal area. R=40 mm., r=15 mm., R=2.66 r; breadth of ray at base 18 mm. Disk large, rays

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minal plate large, with 5 heavy spines; inferomarginals with 2 stout spines and a few pedicellariæ; abactinal plates smooth, bordered by a single series of flat, flush granules, the 5 primary radials and 1 or 2 other radials, as well as the central plate, with a heavy upright blunt spine, the remaining median radial plates and most of the larger plates of central part of disk with a central tubercular granule; numerous very broadly spatulate, foliaceous pedicellariæ; actinal intermediate plates each with a heavy blunt spine (sometimes 2) and a broadly spatulate intrenched pedicellaria; adambulacral plates with a palmate furrow series of 5 to 7 unequal, rather slender, more or less compressed spines, and distally 1, proximally 2, heavy subambulacral spines, resembling those of actinal intermediate plates.

Type.—Cat. No. 30557, U.S.N.M.

Type-locality.—Station 5280, between Lubang and Luzon, south of Manila Bay, 193 fathoms, gray sand; bottom temperature, 49.6° F.

ASTROTHAUMA, new genus.

Differing from *Calliaster* Gray in having the last superomarginal plate much enlarged and in having the marginal and actinal spines with a roughened or thorny surface; plates smooth, bordered by a single series of granules, and with small two-jawed upright pedicellariæ; marginal and actinal plates with heavy, thorny, or roughened spines; prominent upright smooth or slightly eroded spines on center of disk and basal portion of ray; furrow spines numerous, small, in a close comb; subambulacral spines 2 or 3, large, rough, tapering, and sharp.

Type of the genus.—*Astrothauma euphylacteum*, new species.

ASTROTHAUMA EUPHYLACTEUM, new species.

Rays 5. R=86 mm., r=24 mm., R=3.5+r; breadth of ray at base, 27 mm.; thickness of disk at interradius, 8.5 mm. Disk fairly large; rays gradually tapering, rigid, blunt; abactinal plates smooth, bordered by a single series of granules; center of disk and proximal third of radial series with prominent, stout, sharp, upright spines and a few scattered small two-jawed pedicellariæ; superomarginals with the distal-most plate much enlarged and each with 2 or 3, abnormally as many as 5, prominent, sharp spines; inferomarginals with proximally 6 to 8 unequal, tapering, sharp, roughened, or thorny spines, becoming reduced to 4 at middle of series, then 3, and finally to 1 or 2 at end; actinal intermediate plates usually with a sharp thorny spine, at the base of which is a small blunt spatulate

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This genus is essentially *Calliaster* with swollen or enlarged terminal superomarginal plates and thorny or roughened spines. The last character suggests *Milteliphaster* Alcock which has the actinal spines ending in swollen bifid or multifid points. The character of the actinal spines is apparently the only one which separates *Milteliphaster* from *Calliaster*.

Genus ANTHENOIDES Perrier.

Anthenoides Perrier, Bull. Mus. Comp. Zoöl., vol. 9, 1881, p. 23.—Type, *A. peircei* Perrier.

Leptogonaster Sladen, *Challenger* Asteroidea, 1889, p. 326.—Type, *A. cristatus* Sladen.

Antheniaster Verrill, Trans. Conn. Acad., vol. 10, 1899, p. 173.—Type, *Anthenoides sarissa* Alcock.

A comparison of specimens of *Leptogonaster cristatus*, of which there are numerous examples in the Philippine collection, with *Anthenoides peircei* reveals no differential characters of generic importance. *Anthenoides sarissa*, the type of *Antheniaster*, is very closely related to and very evidently congeneric with *Leptogonaster cristatus*. *Leptogonaster* and *Antheniaster* should therefore be abandoned.

The three species herein described belong to a section of the genus, of which *A. epixanthus* is typical, in which the inferomarginals are without lateral spines. These are present in the adults of *peircei*, *cristatus*, and *sarissa*.

KEY TO THE SPECIES OF ANTHENOIDES LACKING LATERAL SPINES.

a^1. Pedicellariæ only on the adambulacral plates; abactinal granules few and microscopic, visible only when abactinal membrane is dried; the abactinal area has superficially the appearance of being without granules.....*epixanthus*.

a^2. Pedicellariæ on the abactinal and actinal intermediate areas, as well as on the adambulacral plates; abactinal granules numerous, at least in center of disk, and easily seen without magnification.

b^1. Superomarginals decreasing regularly and gradually in length from the first; granules distributed uniformly all over abactinal area.

c^1. R=2 r; central granules of each abactinal plate the largest; proximal superomarginal plates coarsely granulated all over; superomarginals all wider than long.....*granulosus*.

c^2. R=2.6 r; granules smaller, uniform; superomarginals finely granulated, only a few proximals with coarse central granules; superomarginals at middle of ray longer than wide.....*rugulosus*.

b^2. Superomarginals maintaining their width to near end of ray; granules numerous in center of disk, becoming much smaller and more widely spaced as periphery is approached; superomarginals of proximal half of ray with coarse central granules.....*lithosorus*.

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ANTHENOIDES GRANULOSUS, new species.

Similar in general appearance to *A. epixanthus* (Fisher) but differing in having much more numerous and coarser abactinal and marginal granules; numerous small abactinal and actinal intermediate, bivalved pedicellariæ; more numerous adambulacral pedicellariæ, which are relatively larger; slender, and slightly more numerous furrow spines, and more numerous oral spines. R=79 mm., r=39 mm., R=2 r; breadth of ray at interbrachium, 43 mm.; disk very large with open, arcuate interbrachia and short, tapering, bluntly pointed rays; whole surface overlaid by soft membrane, obscuring the underlying plates, especially the abactinals, which are covered with spaced granules larger than in *epixanthus;* marginal plates covered all over with spaced granules, coarsest on outer part of plate, and more numerous than in *A. epixanthus;* no marginal spines; actinal intermediate granules coarse and numerous; furrow spines slender, compressed, 6 to 9, the adoral end of the plate with a large, slender, forcipiform pedicellaria, and 1 to 3 more on the actinal surface; subambulacral spines, 1 to 4, according to the number of pedicellariæ, which they partly replace; oral spines 13 to 15, with several suboral pedicellariæ and numerous suboral granules.

Type.—Cat. No. 30559, U.S.N.M.

Type-locality.—Station 5626, between Gillolo and Kayoa Islands, Molucca Islands, 265 fathoms, gray mud, fine sand.

ANTHENOIDES LITHOSORUS, new species.

Closely related to *A. granulosus,* but differing in having the coarse superomarginal granules confined to the center of plate, surrounded by a conspicuous area with only spaced microscopic grains; abactinal granules fine, subequal, thick on center of disk, becoming smaller and more spaced as the margin is approached, fewer than in *granulosus,* smaller, and the central granules of the plate not larger than the others; superomarginal plates more tumid, the width remaining the same to within 4 or 5 plates of end of ray (regularly decreasing in length in *granulosus*); furrow spines 9 or 10; oral spines 15 or 16. R=80 mm., r=44 mm., R=about 1.8 r. General form similar to that of *granulosus* but the rays are thicker toward the end owing to the heavier superomarginals, the last 6 or 7 pairs of which are in contact medially.

Type.—Cat. No. 30560, U.S.N.M.

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characteristic of *granulosus*.) Superomarginals 18. The first 7 plates have a central group of coarse, hemispherical granules, which in a dried specimen remind one of little heaps of stones. The first plate has 24 granules and the seventh, 5 or 6. The first inferomarginals are covered with coarse granules which decrease in size from the edge of ray toward the inner margin of plate.

ANTHENOIDES RUGULOSUS, new species.

Differing from *A. granulosus* in having longer, slenderer rays, narrower marginal plates, rather more numerous and smaller *uniform* abactinal granules, a fine superomarginal granulation (except for a few central coarse hemispherical granules on the proximal plates) and more elevated, pincer-shaped abactinal pedicellariæ. R = 124 mm., r = 47 mm., R = 2.6 + r; breadth of ray at first superomarginal, 52 mm. Disk large, rays distally narrow, tapering arcuately from wide interbrachia; disk more or less inflated; whole body overlaid by smooth, rather thick, soft skin, minutely wrinkled on the abactinal area and covering a fine, close, uniform granulation; small forceps-shaped, abactinal pedicellariæ; superomarginal plates smooth, the membrane covering fine, spaced granules, and on the proximal plates a few scattered coarse central granules; superomarginals of middle region of ray in large specimens longer than wide; actinal interradial areas variable, usually fairly smooth, the plates with central, enlarged, hemispherical granules, as in *granulosus;* the plates adjacent to adambulacrals with a variable number of forcipiform or spatulate, lower, pedicellariæ; furrow spines compressed, usually 7 or 8 proximally, varying to 6 to 9, the armature in general similar to that of *A. granulosus;* oral spines, 14 or 15.

Type.—Cat. No. 30561, U.S.N.M.

Type-locality.—Station 5121, 9 miles southeast of Malabrigo Light, east coast of Mindoro, 108 fathoms, green mud.

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ONE NEW GENUS AND EIGHT NEW SPECIES OF DIPTEROUS INSECTS IN THE UNITED STATES NATIONAL MUSEUM COLLECTION.

By J. R. Malloch,

Of the Bureau of Entomology, United States Department of Agriculture.

In this paper there are presented descriptions of four species of Simuliidæ from Peru which were sent in for identification by Mr. C. H. T. Townsend, chief of the entomological station, Lima, Peru. The species of this genus are at present the subject of study by the writer of this paper in connection with the pellagra investigation. Owing to the theory which has been put forward that they are the possible transmitters of this disease, and as these four species are undescribed it is considered advisable to give descriptions now rather than await the publication of the paper dealing with the North American species which is in course of preparation. The Pipunculidæ are parasitic on leaf hoppers (Hemiptera-Homoptera) and are of considerable economic importance.

SIMULIUM BICOLORATUM, new species.

Plate 46, figs. 6, 7.

Female.—Frons black, shining, with slight whitish dusting, raised in center, slightly tuberculate at lower angles, sides very slightly divergent toward vertex, width at upper angle of eyes about one-fourth the breadth of head; face (see fig. 6) distinctly white dusted, especially on upper portion, the dusting below the bifid raised portions yellowish, very few hairs on either face or frons, antennæ broken, but the two basal joints still left are black; palpi black, postocular cilia pale, with an admixture of much longer black hairs. Prescutum bright yellow, scutum concolorous, opaque, with opaque deep black marking as in figure 7, pilosity sparse and hairlike, yellow, some upright black hairs on posterior margin, middle part of extreme lateral margin deep black, pleuræ brownish, yellowish posteriorly, on center with silky white pollinosity, pleural hair tuft brown; scutellum clear yellow, with numerous upright black hairs which are most con-

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first segment yellow, darkened at apex, next three opaque, velvety black, apical four segments shining brown-black, sides of fifth yellow, apical four segments with scattered pale, and numerous longer, black hairs. Legs black, fore coxæ, bases of all femora, and all tibiæ except apices yellow; all pale portions of legs with silvery, very short pilosity, the black parts with black pilosity, the usual scattered, long, black, upright hairs on all legs, basal joint of hind tarsus with prolonged apical flaplike process posteriorly, second joint of same tarsus with scalelike basal process and dorsal constriction; claws with minute tooth in addition to the basal tubercule. Wings clear, with a slight indication of grayish color at apex, costal vein black-brown at base, becoming black shortly beyond base, subcostal vein yellowish, apical portions of first vein and radial vein black, costal vein with short spinelike bristles and soft hairs, first and radial veins joining the costa very close together and forming a conspicuous black thickening of the costa at about midway from end of subcosta to end of costa which tapers off to end of costa, venation normal. Halteres yellow with base of stalk darkened.

Length.—2½ mm.

Type.—Cat. No. 15304, U.S.N.M.

One female, Rio Charape, Peru, September 13, 1911 (C. H. T. Townsend).

This species is readily distinguishable from any other in the genus by the remarkable coloration of the thorax and abdomen. I know of no closely allied species already described.

SIMULIUM BIPUNCTATUM, new species.

Plate 46, fig. 8.

Female.—Frons black-brown with distinct, metallic, whitish dusting, sides divergent, about three-fifths as wide at above antennæ as at upper angle of eyes, surface hairs upright, black, widely placed and evenly distributed, face almost as wide as frons at upper angle of eyes, concolorous with frons, white dusted, distinctly longer than broad, the surface hairs black, shorter and more numerous than those on frons, antennæ brown, yellowish or three first joints, palpi brown. Mesonotum opaque, ochreous yellow, scutum with indications of a divided central darker stripe and a broader, shorter stripe on each side; in certain lights there is visible on the anterior part of the division between the middle and lateral stripes, where they stop short of anterior margin, a metallic white (or pearlaceous) elongate spot; prescutum and scutum with distinct, black, close-lying hairs which are most distinct and longest on anterior and posterior margins, pilosity regular and rather hair-like, golden yellow; pleuræ yellow,

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brown on lower half of middle portion, membranous portions with longitudinal fold-like striations, in front of wing base a black streak and immediately beneath wing base a round black spot on nearly the level of the pleural tuft which is pale in color, scutellum opaque yellow, posterior margin with long, upright, black hairs, disk with yellow pilosity; postnotum yellow, with black, lateral, longitudinal streak at base. Abdomen opaque yellow, brownish at apex, surface hairs black, longest on apical segments, basal scale yellow, fringe yellow. Legs yellow, tarsi and apices of tibiæ of forelegs, mid tarsi except base of first joint, and apices of tibiæ, most of basal and all but base of second joint of tarsi of hind legs black or brown-black; all legs with many scattered, short, and several long, upright, black hairs, as well as close-lying pale pilosity; apex of basal joint of hind tarsi produced at apex on posterior surface, second hind tarsal joint with basal scale and dorsal excision; basal joint with rather distinct row of about 20 bristles on anterior surface, claws with small subbasal tooth. (See fig. 8.) Wings clear, thick veins yellow, radial vein unforked, joining the costa very close to first vein; a thick tuft of black hairs at base of first vein. Halteres yellow.

Length.—1–1½ mm.

Type and paratypes.—Cat. No. 15305, U.S.N.M.

Nine females, Rio Charape, Peru, September 13, 1911 (C. H. T. Townsend).

Resembles *notatum* Adams, but separable by the color of thorax, and pilosity, and also the shape of claws.

SIMULIUM TOWNSENDI, new species.

Plate 46, fig. 9.

Female.—Frons black, thickly white dusted except on upper half of center, raised somewhat, centrally, on upper half and on lower lateral angles, the sides very slightly divergent posteriorly, surface hairs black, confined to outer third on each side, face thickly white dusted, as broad as frons at upper angle of eyes, distinctly but not greatly longer than broad, surface hairs black; antennæ brown, basal two joints and base of third joint yellow, pilosity whitish; palpi black, the hairs concolorous; postocular cilia mostly black. Scutum opaque black with indications of a grayish bifid central stripe and a broader one on each side, on the narrow curved stripe between those there is a whitish pollinosity, which is very distinct and forms a large pear-shaped spot on near to anterior lateral angle of scutum where the stripe broadens; scutum and prescutum with black upright hairs, which are short on the disk, and yellow scale-like pilosity which is rather sparse and irregularly arranged though not forming groups; sides of scutum gray dusted, prescutum yellow or brownish-yellow; pleuræ brown, darker anteriorly, bare except for pleural tuft, which

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black or black-brown, basal four segments opaque, apical four glossy; numerous brown hairs on apical segments, which are longer on apex and laterally; segment underneath basal scale silvery; basal scale brown, fringe pale brownish yellow. Legs yellow, apices of tibiæ and whole of tarsi of forelegs, coxæ, trochanters slightly, femora indistinctly on center, apical half of tibiæ, apices of basal and all remaining joints except base of second of tarsi of mid and hind legs black; all legs with yellow, long, close-lying pilosity and scattered, upright, black hairs, the first and third fore, second and third mid and hind tarsal joints with two long apical paired hairs each; apex of basal joint of hind tarsi extended on posterior surface, second joint on same tarsi with basal scale and constriction; claws with small subbasal tooth. (See fig. 9). Wings grayish, thick vein brown, cross vein at three-fifths from base of subcosta, venation normal. Halteres yellow.

Length.—4 mm.

Type and paratypes.—Cat. No. 15306, U.S.N.M.

Ten specimens, Rio Charape, Peru, September 13, 1911, collected by C. H. T. Townsend, after whom the species is named.

This species bears a very close resemblance to *virgatum* Coquillett, from which it may be distinguished by the different colored legs, which are very consistently colored throughout the whole series, and also by the almost entirely black postocular cilia and the pale scutellum.

SIMULIUM NITIDUM, new species.

Female.—Frons glossy black, almost undusted, sides nearly parallel, surface hairs black, sparse, confined to near lateral margins; face black with thick opalescent dusting, distinctly broader than frons and almost twice as long as broad, surface hairs sparse, black; antennæ brown, basal two joints and base of third joint yellow, pilosity white; palpi black-brown; hairs concolorous; postocular cilia black. Mesonotum glossy black, viewed from directly above with a divided pearlaceous central stripe and two broader lateral stripes, neither of which reaches beyond posterior third; the middle stripe extends to anterior margin, but the side stripes are much shorter; when viewed from behind the intervening spaces on scutum are pearlaceous, the anterior extremities of curved stripe being noticeably so, and the stripes already mentioned are glossy black; pilosity yellow, almost hair-like, with a few short black hairs on anterior margins, and several in prescutellar depression, prescutum slightly yellowish; pleuræ black, with distinct white pollinosity; scutellum black, pilosity yellow, upright hairs black. Abdomen opaque, velvety black on basal four segments, glossy black on apical

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four, basal scale opaque black, segment underneath it with pearlaceous pollinosity, basal fringe brownish yellow; apical four segments with scattered black hairs. Legs black, fore coxæ, femora, and tibiæ brownish, knees and bases of first three tarsal joints of mid and hind legs yellow, the first tarsal joints broadly so; first joint of hind tarsi produced at apex posteriorly, second with basal scale and dorsal constriction; claws as in *townsendi*, all legs with thickly placed scale-like pilosity and scattered, longer, upright, black hairs, both of which are specially noticeable on the dorsal surfaces of tibiæ. Wings clear, thick veins brown, venation normal; a tuft of brown hairs on base of first vein. Halteres clear yellow, stalk dark at base.

Length.—Nearly 2 mm.

Type and paratype.—Cat. No. 15307, U.S.N.M.

Two females, Huancabamba, Peru, September 6, 1911 (C. H. T. Townsend).

Allied to *miniusculum* Lutz, but he makes no mention of the glossy apical abdominal segments, though they probably are of that color in his species, and he gives the abdominal hairs as pale. The size of the species he describes is also less, 1–1¼ mm. and the locality Brazil.

LIMOSINA PICTURATUS, new species.

Plate 46, fig. 1.

Male.—Frons brownish yellow, blackened from anterior orbital bristles, narrowly, on ocellar triangle, and on vertex, opaque except on those parts, on center and on the bases of the central rows of bristles; lower orbital bristle at middle, very near to second pair, second about five times as far from upper pair as from lower, ocellar bristles widely divergent, only two pairs of weak centrals; behind ocellar region on each side and at base of each of the vertical row of bristles there is a white pollinose spot. Face produced between antennæ, distinctly shining on upper and lower margins, subopaque and paler yellow on center, concave in profile; cheeks yellow, subopaque, at center about one-third as high as eye at center, anterior vibrissa strong, incurved; posterior to it and almost below center of eye a strong upcurved bristle, and on the oral margin numerous hair-like bristles. Antennæ brownish, third joint rounded, second joint with several bristles, third with short pale pilosity; arista distinctly pubescent, about one-third longer than the breadth of frons. Mesonotum black, a series of four white pollinose spots in center, the first on the anterior margin and the last just in front of the scutellum, an irregular stripe of same color from the inner angle of humerus, which stops short of the anterior dorso-central bristle, at the base of which as well as of the posterior pair there is a pollinose spot; other spots are on the humeri, immediately behind humeri, posterior to the last but nearer to center of disk, and one above wing base; the region in front

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of wing base is yellow; on the disk there are numerous hairs and two pairs of macrochætæ; pleuræ opaque black-brown, the sutures paler; scutellum opaque black-brown, a spot at each side at base, one before middle on disk and two at apex pollinose; four marginal bristles present. Abdomen yellowish-brown, each segment narrowly paler anteriorly and posteriorly, a spot of white pollinose color on each segment laterally; numerous scattered hairs on segments, especially on sides and at apex. Legs brown, apices of femora, base, middle, and apices of tibiæ narrowly, apices of first and second, and whole of third joints of tarsi white; all legs with rather distinct hairs, those on posterior surfaces of fore tibiæ and tarsi very long and conspicuous; mid tibiæ with three pairs of dorsal bristles and one ventral bristle which is situated at near to middle; basal joint of hind tarsi very much dilated, about two-thirds as long as second joint which is less thickened. Wings fuscous with hyaline patches (see fig. 1); disk microscopically hairy, costa soft but long haired, bend of second vein appendiculate. Halteres yellow.

Length.—2 mm.

Type.—Cat. No. 15308, U.S.N.M.

Locality.—Manila, Philippine Islands (collector, R. Brown).

This species has a resemblance to *venalicia* Osten Sacken but the very different venation serves to separate them at once.

PIPUNCULUS VIERECKI, new species.

Plate 46, figs. 4 and 5.

Female.—Head exceptionally large, eyes very narrowly separated, frontal stripe slightly widened on center, entirely covered with silvery pile, only the ocellar region black, frons not widened at above antennæ, and not raised in center, eye facets on whole front of eyes from upper portion of frons to middle of face very strikingly enlarged; face silvered, becoming broader toward mouth, at upper margin as broad as frons at above antennæ; antennæ yellow, basal joint brown, second joint with very short hairs above and two to three short but strong bristles on under surface, third joint elongate and acuminate (see fig. 5); arista pale and swollen at base, black from just beyond base, palpi and proboscis yellow. Mesonotum subshining, closely and finely punctate, black with three longitudinal stripes showing through the slight whitish pollinosity of the disk; the stripes are abbreviated posteriorly, no distinct discal hairs present, only a few on humeri and lateral margins; humeri black, a slight depression on posterior third of disk beyond termination of stripes; suture between

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with lateral white pollinose spots low down, basal fringe sparse, black, ovipositor long and acute (see fig. 4), brown at base, yellow on acuminate portion, hairs on base yellow. Legs yellow, fore coxæ black, hind pairs brownish, last tarsal joint on all legs brown, fore and mid femora on posterior surfaces and hind femora on anterior surfaces white pollinose, all tibiæ white pollinose on dorsal surfaces; all femora with double row of short black thorns on apical half of ventral surface, hind pair thickened and with sparse pale pubescence posteriorly; all tibiæ with double row of dorsal and rather irregular anterior and posterior rows of very short black thorns; hind tibiæ thickened and bent, apical joints of all tarsi with several long black hairs, basal joint of hind tarsus thickened, pulvulli very large, yellow. Wings clear, stigma fuscous, not reaching to end of auxiliary vein, second and third costal divisions subequal, inner cross vein below end of auxiliary vein and at slightly before end of basal third of discal cell, outer cross vein at its own length from end of fifth vein. Halteres yellow.

Length.—3½ mm.

Type.—Cat. No. 15272, U.S.N.M.

One female, Plummers Island, Maryland, October 5, 1912 (J. R. Malloch).

Allied to *atlanticus* Hough and *houghii* Kertesz, from which the elongate antennæ easily separates it. The very pale antennæ and legs and the large head are characters which distinguish this from any described American species.

Named in honor of Mr. H. L. Viereck, who collected a large amount of material in this genus in New Mexico, which is recorded in Cresson's paper on the family,[1] and at whose invitation I visited the type-locality on the date of capture.

PIPUNCULUS WINNEMANNÆ, new species.

Plate 46, figs. 2 and 3.

Male.—Eyes coherent for longer than the length of frons, frons black, white dusted except on the raised central ridge of upper half; face brown, as broad as frons at above antennæ, parallel-sided, covered with grayish dusting; antennæ black, third joint acuminate (see fig. 3), arista glossy brown and swollen at base, palpi small, brown; occiput white dusted on lower half, brown dusted above, postocular cilia white. Mesonotum subopaque brown-black, a very few microscopic hairs on disk and numerous short ones on lateral margins; humeri black-brown; pleuræ slightly shining, black with whitish dusting; scutellum subopaque, a few pale post-marginal hairs present, postnotum gray-brown dusted. Abdomen short and rather broad, slightly oval in outline, segments opaque brown at bases, sub-

[1] Trans. Amer. Ent. Soc., vol. 36, 1911, pp. 267–329.

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shining at apices and with distinct whitish lateral post-marginal dusting; basal fringe very short, black; scattered black hairs on lateral margins of segments, those on apical segment more distinct and extending to disk; hypopygium large, distinctly cleft on left side, apical depression absent; the ventral processes large. (See fig. 2.) Legs black, only the extreme apices of femora and bases of tibiæ yellowish; fore and mid femora whitish dusted posteriorly, hind femora glossy posteriorly; ventral thorns present on apical half of mid femora only, no long pubescence either on femora or tibiæ, all femora slender; hind tibiæ with rather distinct setulose hairs on apical half of antero-dorsal surface, and apical half of postero-ventral surface as well as same surface of basal hind tarsal joint with short, stiff, golden hairs; claws as long as apical joint of tarsi, which have three long apical hairs. Wings grayish, stigma slightly short of end of auxiliary vein, second costal division twice as long as third; inner cross vein at just beyond end of auxiliary vein and at slightly short of basal third of discal cell, outer cross vein straight, at its own length from apex of fifth vein, outer portion of fourth vein straight. Halteres brown, pale at base of knob.

Length.—2 mm.

Type.—Cat. No. 15309, U.S.N.M.

One male, Plummers Island, Maryland, October 12, 1912 (H. L. Viereck).

Allied to *stigmatica* Malloch and also to *alternatus* Cresson. The unthickened costa readily separates it from the former and the smaller size and differently shaped antennæ from the latter.

STEINOMYIA, new genus.

Eyes in male separated at vertex by one-fifth the width of head, besides the strong cruciate frontal rows of bristles situated on the inner edge of the orbits there are two pairs of strong bristles situated on the orbits, the upper, backwardly directed pair slightly in front of the anterior ocellus and the lower, outward and slightly backwardly directed pair the breadth of frons lower down from these, in addition to these bristles there is a continuous row of short setulæ from upper angle of orbits to lower angle of frontal stripe; lower margin of frons, at above antennæ, twice as wide as at vertex. Sides of face divergent, one-third wider at epistome than at base of antennæ, orbits higher than facial ridge, vibrissæ strong, incurved, the upper strongest, not continued to apex of third antennal joint, in profile the head is as in *Fannia*. Antennæ shorter than face, arista very indistinctly pubescent. Mesonotum with 2 pairs of presuturals and 3 pairs of postsuturals; acrosticals in three rows; 2 sternopleurals, 5–6 mesopleurals, and 2 moderately strong discal scutellar as well as the normal marginal bristles and discal hairs. Abdomen ovate, flattened,

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one and one-half times as long as greatest breadth, hypopygium very inconspicuous. Legs somewhat similar in form and chætotaxy to some species of *Fannia* but in one specimen there is a distinct bristle on the ventral surface of the mid tibia, which I consider abnormal. Wing venation as in *Fannia*.

Type of genus—Steinomyia steini, new species.

STEINOMYIA STEINI, new species.

Male.—Black, shining; frontal orbits silvered, frontal stripe velvety black, face brown, gray dusted; besides the vibrissæ there are 3–4 smaller bristles external to the anterior pair; palpi black, of moderate length, with hair-like bristles; proboscis as in *Fannia*, antennæ black, third joint 2½ times as long as second, gray pruinose. Mesonotum unstriped, the sides white dusted; pleuræ white dusted, scutellum concolorous with mesonotum. Abdomen with very slight whitish surface dusting, no trace of any dorso-central stripe; second segment slightly longer than third, third and fourth subequal, fifth longer than second, first very short, all segments with numerous short discal hairs, second with long lateral, third and fourth with long lateral post-marginal, and fifth with several long lateral and two apical bristles; on ventral surface the last segment is distinctly bristled; hypopygium black, gray pruinose, symmetrical, the two rounded lateral plates inclosing the genital organs each with one long and several shorter apical bristles, ventrally the organs are yellowish brown. Legs black; fore femora with three rows of bristles, one on each of the three posterior surfaces, fore tibiæ with one bristle at near to apex on dorsal surface, mid femora not distinctly constricted on apical third, antero-ventral surface with a series of 7 evenly spaced bristles on basal three-fifths the last two of which are distinctly stronger than first five, beyond these is a series of about 12 comblike short bristles which decrease slightly toward tip, antero-dorsal row of 16 bristles decreasing slightly in size beyond middle and the last 3–4 at apex suddenly enlarged, postero-ventral row with 1 very long hairlike basal bristle, 9 hairlike bristles on basal two-thirds, and 2 strong and several successively weaker bristles on apical third, posterior row long and hairlike except apical 3–4 which are strong; mid tibiæ slightly thickened on apical two-fifths, the pubescence barely longer on ventral surface than on dorsal, one antero- and one postero-dorsal bristle at apical third and one dorsal bristle at apex; hind femora bare on antero-ventral surface, two long bristles on apical third of postero-ventral surface and the normal curved posterior row present, the last 3 being strongest; hind tibiæ slightly bent, antero-dorsal surface with a continuous row of short bristles (17–18) the last (apical) 3–4 strongest and most widely spaced, the usual 2 dorsal bristles as in *Fannia*, antero-ventral surface with 1–2

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third and fourth veins slightly convergent at apices, outer cross vein bent, at less than its own length from end of fifth and at one-fourth from small cross vein to apex of fourth; costal thorn absent. Calyptræ white, the under scale much the larger. Halteres yellow, base of stalk darkened.

Length.—4–4½ mm.

Type—Cat. No. 15310, U.S.N.M.

Three males, Bonhill, Dumbartonshire, Scotland, June 29, 1907, and August 8 and 29, 1908 (J. R. Malloch).

This genus is closely allied to *Fannia* Robineau-Desvoidy, but may be easily separated by the wider frons, different frontal bristling, and unmarked abdomen, as well as several minor characters given in description. The species bears a remarkable resemblance to the females of certain species of *Fannia*.

Named in honor of Herr P. Stein, whose work on this group in Europe has laid the foundation of practically all that has been done in systematic work on it in recent years.

EXPLANATION OF PLATE 46.

Fig. 1. Wing of *Limosina picturatus*, male.
2. Hypopygium of *Pipunculus winnemannæ*, male.
3. Antenna of *Pipunculus winnemannæ*, male.
4. Ovipositor of *Pipunculus vierecki*, female.
5. Antenna of *Pipunculus vierecki*, female.
6. Face of *Simulium bicoloratum*, female.
7. Thorax of *Simulium bicoloratum*, female.
8. Claw of *Simulium bipunctatum*, female.
9. Claw of *Simulium townsendi*, female.

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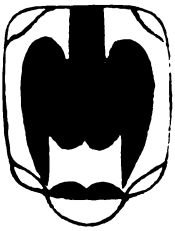

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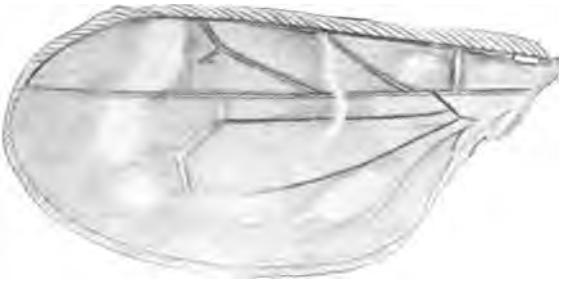

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DETAILS OF NEW FLIES.

FOR EXPLANATION OF PLATE SEE PAGE 658.

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